Idaho National Engineering and Environmental Laboratory

IDAHO DEPARTMENT OF HEALTH AND WELFARE
DIVISION OF ENVIRONMENTAL QUALITY

Record of Decision Amendment

Record of Decision Amendment for the V-Tanks (TSF-09 and TSF-18) and Explanation of Significant Differences for the PM-2A Tanks (TSF-26) and TSF-06, Area 10, at Test Area North, Operable Unit 1-10

at the Idaho National Engineering and Environmental Laboratory
Idaho Falls, Idaho

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Record of Decision Amendment for the V-Tanks (TSF-09 and TSF-18) and Explanation of Significant Differences for the PM-2A Tanks (TSF-26) and TSF-06, Area 10, at Test Area North, Operable Unit 1-10

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Prepared for the
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Idaho Operations Office

PART I - DECLARATION

SITE NAME AND LOCATION

V-Tanks (TSF-09 and TSF-18) and
PM-2A Tanks (TSF-26) and TSF-06, Area 10,
at Test Area North, Waste Area Group 1, Operable Unit 1-10
Idaho National Engineering and Environmental
Laboratory (CERCLIS ID 4890008952)
Idaho Falls, Idaho

Test Area North (TAN) is one of nine major facilities at the Idaho National Engineering and Environmental Laboratory (INEEL), a U.S. Department of Energy (DOE) facility located in southeastern Idaho, 51.5 km (32 mi) west of Idaho Falls. The INEEL encompasses approximately 2,305 km^2 (890 mi^2) of the northeastern portion of the Eastern Snake River Plain and extends across portions of five counties: Butte, Jefferson, Bonneville, Clark, and Bingham. The TAN complex, near the northern end of the INEEL, extends over an approximately 30-km^2 (12-mi^2) area. The Technical Support Facility (TSF), which is centrally located within TAN, covers an approximate 460 by 670-m (1,500 by 2,200-ft) area and is surrounded by a security fence. The V-Tanks (TSF-09 and TSF-18), the PM-2A Tanks (TSF-26), and the Reactor Vessel Burial Site (TSF-06, Area 10) are located within the TSF. Waste Area Group (WAG) 1 includes facilities throughout TAN. Operable Unit (OU) 1-10 was developed to comprehensively address those remedial activities at TAN not addressed in other Records of Decision (RODs).

STATEMENT OF BASIS AND PURPOSE

This ROD Amendment and Explanation of Significant Differences (ESD) documents modifications and clarifications to the remedial actions for three sites: the V-Tanks (TSF-09 and TSF-18), the PM-2A Tanks (TSF-26), and the Reactor Vessel Burial Site (TSF-06, Area 10). The original selected remedial actions for these sites were documented in the *Final Record of Decision for Test Area North, Operable Unit 1-10* (DOE-ID 1999a [DOE/ID-10682]) (the 1999 ROD).

For the V-Tanks, a ROD Amendment is necessary because modification of the original selected remedy for the V-Tanks contents was required after the proposed technology became commercially unavailable, and the risk of it remaining unavailable was considered to be too high to proceed under the existing 1999 ROD. The original remedy for the piping used to transfer waste to and from the tanks, the tanks, and the in-line sand filter is not changed significantly by this ROD Amendment.

For the PM-2A Tanks site, an ESD is necessary because a significant change that does not fundamentally alter the overall cleanup approach is being made to the component of the original selected remedy concerning removal and treatment of the tank contents. New information from analysis of the tank during remedial design activities indicates that by making this change, remediation of the PM-2A Tanks site can be completed more quickly; at a lower cost; and with a significant reduction in potential risk to workers, human health, and the environment.

In addition, a clarification is necessary for the V-Tanks and the PM-2A Tanks site because a change that does not fundamentally alter the overall cleanup approach is being made to the component of the original selected remedy concerning remediation of contaminated soil at each of these sites. Since the 1999 ROD was signed, new information has been generated from sampling and analysis of the soil at both of these sites, resulting in the need to clarify the soil remediation portion of the remedies for these sites.

For the Reactor Vessel Burial Site (TSF-06, Area 10), an ESD is necessary because public comments and internal reviews revealed the need to reclassify this site as "No Further Action" (from its previous listing as "No Action") and to apply appropriate institutional controls.

The modifications presented in this ROD Amendment and ESD were chosen in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) (42 USC§ 9601 et seq.), as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA), and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). The documents that form the basis for the decisions made in this ROD Amendment and ESD are contained in the Administrative Record for OU 1-10. The decisions documented in this ROD Amendment and ESD satisfy the requirements of the *Federal Facility Agreement and Consent Order for the Idaho National Engineering Laboratory* (FFA/CO) (DOE-ID 1991) entered into among the DOE, the U.S. Environmental Protection Agency (EPA), and the State of Idaho.

The DOE Idaho Operations Office (NE-ID[a]) is the lead agency for the remedy decisions under Executive Order 12580. The EPA approves the decisions and, along with the Idaho Department of Environmental Quality (IDEQ), has participated in the selection of the remedies described in this document. The IDEQ concurs with the amended remedies. The DOE, EPA, and IDEQ are collectively referred to as "the Agencies" in this document. Within the INEEL's environmental restoration program, this action is being undertaken within the project designated OU 1-10. OU 1-10 is the comprehensive investigation for CERCLA sites within WAG 1.

V-Tanks (TSF-09 and TSF-18)

The V-Tanks are being remediated to prevent any potential future release of the tank contents to the environment. The contents of the V-Tanks are primarily aqueous sludge contaminated with radionuclides, organic compounds (including polychlorinated biphenyls [PCBs]), and inorganic contaminants (including metals). Some of the soil surrounding the tanks is contaminated, principally with Cs-137 and Co-60. The contamination originated from accidental releases during periodic pumping operations to remove excess liquid from the V-Tanks (Section 4.1.6 of the *Comprehensive Remedial Investigation/Feasibility Study for the Test Area North Operable Unit 1-10 at the Idaho National Engineering and Environmental Laboratory* [RI/FS] [DOE-ID 1997] provides more information about V-Tanks operations). The surrounding contaminated soils and associated piping will be remediated along with the V-Tanks.

The original selected remedial action for the V-Tanks contents documented in the 1999 ROD was identified as "Alternative 2: Soil and Tank Removal, Ex Situ Treatment of Tank Contents, and Disposal." However, the non-INEEL facility selected to treat the tank contents became no longer available for carrying out the type of treatment called for in the selected remedy, and no other non-INEEL facility is available that can perform the treatment specified in the selected remedy. Therefore, it was necessary to select a new remedy for the tank contents. As stated before, although significant changes are not being made to the part of the remedy that deals with the removal and disposal of contaminated soil from around the tanks and the tanks themselves, these parts of the remedy are being modified for clarity.

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a. The abbreviation NE-ID signifies that the U.S. Department of Energy, Idaho Operations Office (which was abbreviated DOE-ID before October 1, 2003) reports to the DOE Office of Nuclear Energy, Science and Technology.

After reviewing potentially applicable treatment techniques, three technologies (with multiple variations) were selected for the formal evaluation process in 2002 and 2003. The evaluation emphasized currently available, cost-effective, safe, and feasible treatment, storage, and disposal options. The technology identified as the best alternative is chemical oxidation/reduction followed by stabilization. The technology will be implemented on the INEEL, primarily at the V-Tanks site or adjacent areas (e.g., TAN 607) as necessary to facilitate remediation. Therefore, in accordance with Section 117(c) of CERCLA and Section 300.435(c)(2)(ii) of the NCP, and pursuant to the 1999 ROD, this ROD Amendment has been prepared to document the changes.

The amended remedy identified in this ROD Amendment is intended to be the final action for remediation of the V-Tanks. All public participation and documentation procedures specified in NCP Sections 300.435(c)(2)(ii) and 300.825(a)(2) were conducted as required, including issuing a proposed plan (the *New Proposed Plan for the V-Tanks Contents (TSF-09 and TSF-18) at Test Area North, Operable Unit 1-10* [DOE-ID, EPA, and IDEQ 2003]) that highlighted the proposed changes.

PM-2A Tanks (TSF-26)

Like the V-Tanks, the PM-2A Tanks are being remediated to prevent any potential future release of tank contents to the environment. The PM-2A Tanks contain solidified sludge contaminated with radionuclides, organic compounds (including polychlorinated biphenyls [PCBs]), and inorganic contaminants (including metals). Unlike the V-Tanks, essentially no free liquids are present in these tanks because in 1981 the tanks were partially filled with material to absorb free liquid. However, as with the V-Tanks, some of the soil surrounding the tanks is contaminated, principally with Cs-137. The contamination originated from accidental releases during periodic pumping operations to remove excess liquid from the PM-2A Tanks (Section 4.1.6 of the 1997 RI/FS provides more information about PM-2A Tanks operations). The tanks are part of a system that includes ancillary piping and equipment within the area designated as the PM-2A Tanks site. The surrounding contaminated soils and associated piping will be remediated along with the PM-2A Tanks.

The original selected remedial action for the PM-2A Tanks contents documented in the 1999 ROD was identified as "Alternative 3d: Soil Excavation, Tank Content Vacuum Removal, Treatment, and Disposal." However, during remedial design activities, including additional sampling, the Agencies determined the tanks were structurally strong enough that they could be removed intact, with the contents still inside. As described in Section 7.2.2.2 of the 1999 ROD, "removal and decontamination [of the tank contents and the tanks themselves] increase the chance of worker exposure and, therefore, lower the short-term effectiveness." In addition to avoiding potential worker exposure, removal of the tanks with the contents inside will cost less and require less time to complete remediation. As provided in the original selected remedy, the tank contents will be treated as necessary to meet land disposal restrictions (LDRs) and stabilized to meet other waste acceptance criteria (WAC) for disposal at the INEEL CERCLA Disposal Facility (ICDF) or other approved facility. Treatment will take place at or adjacent to the PM-2A Tanks site (e.g., TAN 607) as necessary to facilitate remediation.

As stated above, although significant changes are not being made to the part of the remedy that deals with the removal and disposal of contaminated soil from around the tanks and the tanks themselves, these parts of the remedy are being modified for clarity.

Reactor Vessel Burial Site (TSF-06, Area 10)

TSF-06, Area 10, is the designation for the Reactor Vessel Burial Site. This potential release site was evaluated as part of the WAG 1 Comprehensive RI/FS and, as documented in the 1999 ROD, it was determined to be a "No Action" site. The empty, irradiated reactor vessel is contained in a metal storage tank below the ground surface. No pathway to human or ecological receptors exists; thus, no cleanup is required.

However, during public participation activities conducted in 2003 in connection with the *New Proposed Plan for the V-Tanks Contents (TSF-09 and TSF-18) at Test Area North, Operable Unit 1-10* [DOE-ID, EPA, and IDEQ 2003]), a commenting group submitted questions about this site. A review was conducted by the Agencies of the relevant documentation, and it was determined that although no pathway exists, potential residual contamination precludes unrestricted land use. The site should be categorized as a "No Further Action" site and protected with institutional controls. The *Institutional Control Plan for Test Area North Waste Area Group 1* (INEEL 2000b) will be modified to include appropriate institutional controls for this site. Detailed language has been added in Section 11.3 of this ROD Amendment and ESD directing this change to the 1999 ROD. The Agencies appreciate the dedication of this public group in bringing the oversight to their attention. The Agencies are pleased to observe that this confirms the value of the design of the CERCLA public involvement process.

ASSESSMENT OF THE SITE

The response actions selected in this ROD Amendment and ESD are necessary to protect public health, welfare, and/or the environment from actual or threatened releases of hazardous substances into the environment. Such a release or threat of release may present an imminent and substantial endangerment to public health, welfare, or the environment.

DESCRIPTION OF THE AMENDED REMEDY FOR THE V-TANKS

The complete amended remedy for the V-Tanks is Soil and Tank Removal, Chemical Oxidation/Reduction with Stabilization of Tank Contents, and Disposal. The major treatment activities will take place at the V-Tanks site or in adjacent areas (e.g., TAN 607), as necessary to facilitate remediation. The amended remedy will prevent unacceptable exposure of workers, the public, and the environment to contaminants in the V-Tanks. This remedial action will permanently reduce the toxicity and mobility of the contamination in the V-Tanks. It will meet the final remedial action objectives (RAOs) by removing the source of contamination and, thus, breaking the pathway by which a future receptor may be exposed. This will be the final action for this site. The portion of the amended remedy that addresses removal and treatment of the V-Tanks contents will address the principal threat posed by the V-Tanks contents.

The amended remedy changes the actions that will be taken for the V-Tanks contents. The tank contents will be removed and treated as necessary to meet LDRs. Treatment includes addition of a chemical oxidant/reductant used to destroy the organic compounds followed by stabilization. The waste then will be disposed of at the ICDF or other approved facility. The ICDF was designated by the Agencies in the *Final Record of Decision for the Idaho Nuclear Technology and Engineering Center, Operable Unit 3-13* (DOE-ID 1999b) as an appropriate disposal facility for all INEEL-generated CERCLA waste that meets the ICDF's WAC. This amended remedy meets the applicable or relevant and appropriate requirement (ARAR) (40 CFR 761.61[c]) for a risk-based approach to remediation of the V-Tanks contents. Finally, pursuant to the original remedy selected in the 1999 ROD and refined in the *Explanation of Significant Differences for the Record of Decision for the Test Area North Operable Unit 1-10* (DOE-ID 2003a [DOE/ID-11050]), the surrounding contaminated soil, the tanks, and debris will be removed and disposed of at the ICDF or other approved facility. The final remediation goal (FRG) for soil surrounding the V-Tanks is 23.3 pCi/g for cesium-137 (Cs-137).

The amended remedy for the V-Tanks (TSF-09 and TSF-18) consists of 15 components divided into three subsets—(1) new or modified components of the amended remedy, (2) components of the original remedy that are clarified and remain in effect, and (3) components identified in the 2003 ESD that are in effect, as follows:

New or Modified Components of the V-Tanks Amended Remedy

1. Conducting further sampling and/or analysis of the V-Tanks contents to support refinement of the Resource Conservation and Recovery Act (RCRA) (42 USC§ 6901 et seq.) characteristic evaluation to determine whether treatment is required for underlying hazardous constituents. The results of this step will be subject to review and concurrence by the Agencies.

2. Consolidating and/or blending of the tank contents to the extent practical to facilitate management of the waste as one homogenous waste stream. If laboratory studies on sludge treatment demonstrate a clear benefit, some of the liquid excess from the treatment process may be decanted and treated separately from the remainder of the waste.

3. Continued temporary use of Tank V-9 for storage until the contents of that tank are removed for transfer to another V-Tank. Continued temporary use of Tanks V-1, V-2, and V-3 without secondary containment for storage of waste prior to treatment, blending waste prior to treatment, and/or providing an accumulation location for treated waste prior to stabilization.

4. Chemically oxidizing/reducing the VOCs in the V-Tanks contents as necessary to meet applicable RCRA LDR F001 treatment standards in accordance with ARARs as well as ICDF or other approved disposal facility WAC. Chemical oxidation/reduction of PCBs will be performed as necessary to demonstrate no unreasonable risk to human health and the environment, as part of a PCB risk-based management strategy developed under 40 CFR 761.61(c). Chemical oxidation/reduction will be required for specific underlying hazardous constituents (e.g., BEHP) if the waste is confirmed to exhibit an RCRA characteristic. Laboratory studies will be conducted to optimize the choice of specific oxidant(s)/reductant(s) (e.g., peroxide) and to optimize the treatment process. The treatment process selected may be multi-stage and will be conducted ex situ at the V-Tanks site or in adjacent areas (e.g., TAN 607), as necessary to facilitate remediation.

5. Performing additional treatment (e.g., solidification, stabilization) of the V-Tanks contents as necessary to meet ICDF or other approved disposal facility WAC.

6. Disposing of the treated tank contents at the ICDF or other approved facility.

7. Removing and disposing of the V-Tanks and associated piping at the ICDF or other approved facility.

8. Shipping treatment system off-gas residues and other secondary wastes to the ICDF or an approved treatment facility as necessary based on characterization of the wastes.

Components from the V-Tanks Original Remedy that are Clarified

9. Excavating contaminated soil:

   - Excavating contaminated soil that exceeds the FRG to a maximum of 3 m (10 ft) below ground surface (bgs)

   - Excavating additional soil below 3 m (10 ft) bgs to the extent necessary to remove the V-Tanks and associated piping.

10. Disposing of the contaminated soil at an approved soil repository.

11. Performing post-remediation soil sampling to verify FRGs are met and to analyze for additional contaminants if excavation indicates a release of the V-Tanks contents:

    - For contaminated soil less than 3 m (10 ft) bgs, perform post-remediation sampling to verify FRGs are met

    - For contaminated soil more than 3 m (10 ft) bgs, perform post-remediation sampling to determine the need for institutional controls

    - For contaminated soil beneath the V-Tanks and piping where there is evidence of a release (either a leak from a V-Tank or the associated piping), perform post-remediation soil sampling at the bottom of the excavation to analyze for V-Tanks contaminants to support a risk analysis that supports a potential revision to the FRGs and a determination of the need for further actions. This determination could lead to application of institutional controls, further remediation, or no action

    - For contaminated soil beneath the V-Tanks and piping where there is no evidence of a release from either the V-Tanks or the associated piping, perform post-remediation soil sampling to determine the appropriate institutional controls, if any, for this site.

12. Filling the excavated area with clean soil (soil that meets remedial action objectives [RAOs]) and then contouring and grading to the surrounding elevation.

13. Establishing and maintaining institutional controls consisting of signs, access controls, and land-use restrictions, depending on the results of post-remediation sampling. Institutional controls will be required if residual contamination precludes unrestricted land use after completion of remedial action.

Components from the 2003 Explanation of Significant Differences for the V-Tanks

14. Further characterizing the surrounding contaminated soil and further defining the corresponding area of contamination.

15. Adding ARARs for managing PCB remediation waste (as described in Section 9).

Remedial action objectives for the V-Tanks site will be met through the completion of active remediation (projected for 2007) and implementation of institutional controls. As stated in the 1999 ROD (DOE-ID 1999a), the amended remedy continues to address the risks posed by the V-Tanks by effectively removing the source of contamination and, thus, breaking the pathway by which a future receptor may be exposed.

STATUTORY DETERMINATION

The amended remedy for the V-Tanks is (a) protective of human health and the environment, (b) complies with federal and state requirements that are applicable or relevant and appropriate to the remedial actions, (c) is cost effective, and (d) utilizes permanent solutions and alternative treatment (or resource recovery) technologies to the maximum extent practicable.

This amended remedy for the V-Tanks also satisfies the statutory preference for treatment as a principal element of the amended remedy (i.e., reduces the toxicity, mobility, or volume of hazardous substances, pollutants, or contaminants as a principal element through treatment).

Under the amended remedy, the waste currently in the V-Tanks will be removed; however, pursuant to the original remedy, contaminants in the surrounding soil may remain at the V-Tanks site after active remediation above levels that allow for unlimited use and unrestricted exposure. If so, institutional controls consisting of signs, access controls, and land-use restrictions will be established and maintained. In addition, a statutory review will be conducted within 5 years after initiation of remedial action, and at least every 5 years thereafter through the standard CERCLA 5-year review process. The reviews will be conducted to ensure that the amended remedy is protective of human health and the environment. This provision does not preclude more frequent reviews by one or more of the Agencies.

RECORD OF DECISION DATA CERTIFICATION CHECKLIST

The following information about the V-Tanks is included in the Decision Summary section (Part II) of this ROD Amendment: (Note: Additional information can be found in the Administrative Record for this OU.)

- Contaminants for treatment and their respective concentrations (Part II, Section 2)
- Estimated costs (in net present value [NPV] using a 7% discount rate) (Part II, Section 8)
- Key factor(s) that led to selecting the amended remedy (i.e., how the amended remedy provides the best balance of tradeoffs with respect to the balancing and modifying criteria, highlighting criteria key to the decision (Part II, Section 7)
- How source materials constituting principal threats are addressed (Part II, Section 9.5).

The following information about the V-Tanks is not included in this ROD Amendment because it is unchanged from the original 1999 ROD:

- Contaminants of concern (COCs) and their respective concentrations
- Baseline risk represented by the COCs
- Cleanup levels established for the COCs and the basis for these levels
- Current and reasonably anticipated future land-use assumptions used in the baseline risk assessment and 1999 ROD.

SIGNATURE SHEET

Signature sheet for the Record of Decision Amendment for the V-Tanks (TSF-09 and TSF-18) and Explanation of Significant Differences for the PM-2A Tanks (TSF-26) and TSF-06, Area 10, at Test Area North, Operable Unit 1-10, of the Idaho National Engineering and Environmental Laboratory, between the U.S. Environmental Protection Agency Region 10 and the U.S. Department of Energy Idaho Operations Office, with concurrence by the Idaho Department of Environmental Quality.

M F Gearheard — 7/19/04

Michael F. Gearheard, Director
Environmental Cleanup Office, Region 10
U.S. Environmental Protection Agency

Date

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C. Stephen Allred

C. Stephen Allred, Director
Idaho Department of Environmental Quality

1/20/04
Date

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Richard B. Provencher, Deputy Manager Idaho Completion Project U.S. Department of Energy, Idaho Operations Office	2/20/04 Date

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ACRONYMS

ALARA	as low as reasonably achievable
AOC	area of contamination
ARAR	applicable or relevant and appropriate requirement
ATG	Allied Technology Group
BEHP	bis-2-ethylhexyl phthalate
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
COC	contaminant of concern
DOE	U.S. Department of Energy
DOT	U.S. Department of Transportation
DRE	destruction and removal efficiency
EPA	U.S. Environmental Protection Agency
ESD	Explanation of Significant Differences
FFA/CO	Federal Facility Agreement and Consent Order
FRG	final remediation goal
FY	fiscal year
GAC	granular-activated carbon
HEPA	high-energy particulate air (filter)
HTRE	Heat Transfer Reactor Experiment
ICDF	INEEL CERCLA Disposal Facility
IDAPA	Idaho Administrative Procedures Act
IDEQ	Idaho Department of Environmental Quality
IDW	investigation-derived waste
INEEL	Idaho National Engineering and Environmental Laboratory
KYNF	Keep Yellowstone Nuclear Free

LDR	land disposal restriction
MACT	maximum achievable control technology
MCL	maximum contaminant level
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NE-ID	U.S. Department of Energy, Idaho Operations Office
NESHAPS	National Emission Standards for Hazardous Air Pollutants
NPV	net present value
NTS	Nevada Test Site
O&M	operations and maintenance
OSWER	(EPA) Office of Solid Waste Environmental Remediation
OU	operable unit
PCB	polychlorinated biphenyl
PCE	tetrachloroethylene
RAO	remedial action objective
RCRA	Resource Conservation and Recovery Act
RD/RAWP	remedial design/remedial action work plan
RI/FS	remedial investigation/feasibility study
ROD	Record of Decision
SARA	Superfund Amendments and Reauthorization Act of 1986
SGAC	sulfur-impregnated granular-activated carbon
SOW	scope of work
SRA	Snake River Alliance
SVOC	semivolatile organic compound
TAN	Test Area North
TCA	1,1,1-trichloroethane
TCE	trichloroethylene

TER	Technology Evaluation Report
TRU	transuranic
TSCA	Toxic Substances Control Act
TSF	Technical Support Facility
UHC	underlying hazardous constituents
UST	underground storage tank
UTS	universal treatment standard
VOC	volatile organic compound
WAC	waste acceptance criteria
WAG	waste area group
WIPP	Waste Isolation Pilot Plant

NOMENCLATURE

bgs	below ground surface
C	centigrade
Co	cobalt
Cs	cesium
F	Fahrenheit
ft	feet
g	gram
gal	gallon
Hg	mercury
in.	inch
kg	kilogram
L	liter
m	meter
mg	milligram
mm	millimeter
mrem	millirem
mi	mile
nCi/g	nanocuries per gram
pCi/g	picocuries per gram
w%	weight percent
yr	year

Record of Decision Amendment for the V-Tanks (TSF-09 and TSF-18) and Explanation of Significant Differences for the PM-2A Tanks (TSF-26) and TSF-06, Area 10, at Test Area North, Operable Unit 1-10

PART II – DECISION SUMMARY

1. INTRODUCTION AND STATEMENT OF PURPOSE

This Record of Decision (ROD) Amendment and Explanation of Significant Differences (ESD) documents modifications to the original remedy for three sites in Operable Unit (OU) 1-10 at the Idaho National Engineering and Environmental Laboratory (INEEL): the V-Tanks (TSF-09 and TSF-18), the PM-2A Tanks (TSF-26), and the Reactor Vessel Burial Site (TSF-06, Area 10). The original remedy was documented in the *Final Record of Decision for Test Area North, Operable Unit 1-10* (DOE-ID 1999a [DOE/ID-10682]) (the 1999 ROD).

- **Site Name and Location:**

  V-Tanks (TSF-09 and TSF-18), PM-2A Tanks (TSF-26),
  and the Reactor Vessel Burial Site (TSF-06, Area 10)
  Waste Area Group 1, Operable Unit 1-10,
  Idaho National Engineering and Environmental
  Laboratory (CERCLIS ID 4890008952),
  Idaho Falls, Idaho.

- **Identification of Lead and Support Agencies:** The U.S. Department of Energy (DOE) Idaho Operations Office (NE-ID) is the lead agency for the remedy decisions under Executive Order 12580. The U.S. Environmental Protection Agency (EPA) approves the decisions and, along with the Idaho Department of Environmental Quality (IDEQ), has participated in the selection of the remedies described in this document. The IDEQ concurs with the amended remedies. The DOE, EPA, and IDEQ are collectively referred to as "the Agencies" in this document.

- **Statutory Requirements Met:** In accordance with Section 117(c) of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and Section 300.435(c)(2)(ii) of the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), and pursuant to the 1999 ROD, this ROD Amendment and Explanation of Significant Differences has been prepared to document changes to the 1999 ROD. All public participation and documentation procedures specified in NCP Sections 300.435(c)(2)(ii) and 300.825(a)(2), including, for the V-Tanks site, issuing a revised proposed plan (the *New Proposed Plan for the V-Tanks Contents (TSF-09 and TSF-18) at Test Area North, Operable Unit 1-10* [DOE-ID, EPA, and IDEQ 2003 {Administrative Record No. 24783}{the 2003 Proposed Plan}]) that highlighted the proposed changes, were conducted as required.

- **Date of Original ROD Signature:** December 14, 1999.

- **Need for ROD Amendment:** This ROD Amendment documents fundamental changes to certain features of the V-Tanks original remedy selected in the 1999 ROD. (Information about the significant changes at the other two sites discussed in this document are chiefly contained in Section 11.) No facility is available to conduct the treatment of V-Tanks contents as specified in the 1999 ROD. Therefore, the Agencies evaluated several technologies to identify a new alternative for remediation of the V-Tanks contents. From this evaluation, the Agencies have selected chemical oxidation/reduction at the INEEL with stabilization for treatment of the V-Tanks contents.

- **Need for Explanation of Significant Differences:** The ESD portion of this record documents significant changes to certain features of the original remedies selected in the 1999 ROD for the PM-2A Tanks and for the Reactor Vessel Burial Site (TSF-06, Area 10). The ESD portion of this document is contained in Section 11. The remainder of this document chiefly concerns the fundamental changes to the V-Tanks.

- **Location of Administrative Record and Hours of Availability:** The documents that form the basis for the decisions made in this ROD Amendment and ESD are contained in the Administrative Record for OU 1-10. This ROD Amendment and ESD will become part of the Administrative Record pursuant to Section 300.825(a)(2) of the NCP. The Administrative Record is part of the INEEL's Information Repositories, which are available to the public at the following locations:

  INEEL Technical Library
  DOE Public Reading Room
  1776 Science Center Drive
  Idaho Falls, ID 83415
  (208) 526-1185
  Hours: 8 a.m. to 5 p.m. Monday through Friday, except as posted

  Albertsons Library
  Boise State University
  1910 University Drive
  Boise, ID 83725
  (208) 385-1621
  Hours: 7:30 a.m. to 12 midnight, Monday through Thursday; 7:30 a.m. to 8 p.m. Friday; 10 a.m. to 8 p.m. Saturday; 10 a.m. to midnight Sunday, except as posted

  University of Idaho Library
  University of Idaho Campus
  434 2nd Street
  Moscow, ID 83843
  (208) 885-6344
  Hours: 8 a.m. to midnight, except as posted

  and on the Internet (at http://ar.inel.gov). In addition, documents that are included in the Administrative Record are listed in Appendix B, Administrative Record Index.

2. OPERABLE UNIT 1-10 HISTORY AND V-TANKS ORIGINAL REMEDY

2.1 V-Tanks History

The two V-Tanks sites (TSF-09 and TSF-18) have similar attributes and are located in the same area (see Figure 2-1). Because of the similarities between the two sites and because they were part of the same waste system (the Intermediate Level Waste System), they were evaluated together. The V-Tanks site TSF-09 includes three 10,000-gal (37,850-L) underground storage tanks (USTs) (Tanks V-1, V-2, and V-3), the contents of the tanks, associated piping, and the surrounding contaminated soil. The tops of the tanks are approximately 3 m (10 ft) below ground surface (bgs). The V-Tanks site TSF-18 includes a 400-gal (1,514-L) UST (Tank V-9), the tank contents, associated piping (including an in-line sand filter), and the surrounding soil. The tank is approximately 2 m (7 ft) bgs. As shown in Table 2-1, the combined volume of waste in the tanks is approximately 12,000 gal, including 2,000 gal of sludge and 10,000 gal of liquid.

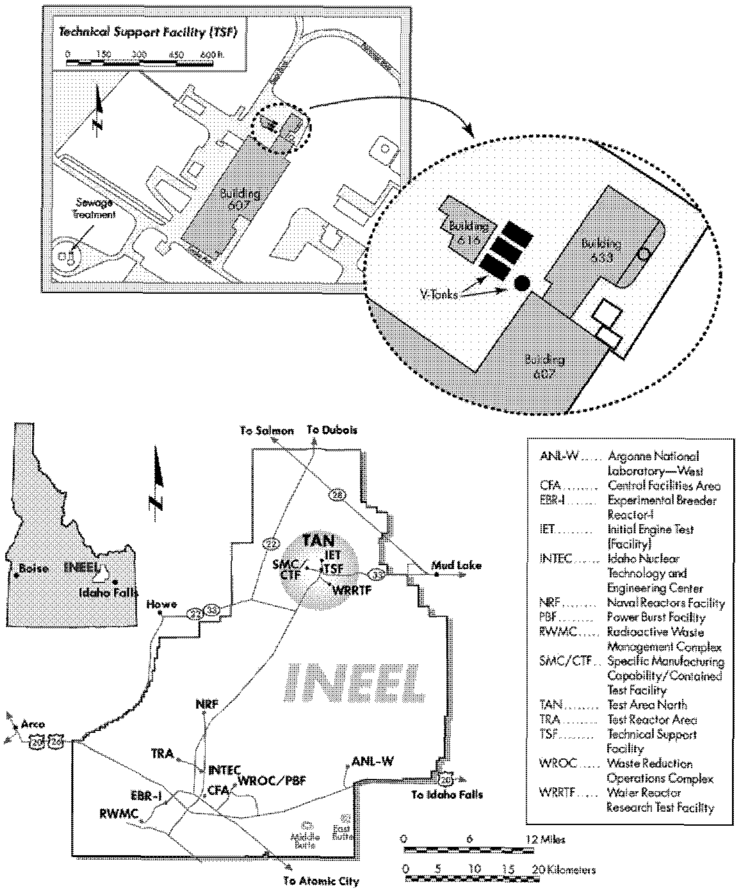

Figure 2-1. Location of Test Area North at the Idaho National Environmental and Engineering Laboratory.

Table 2-1. V-Tanks capacity and volume of contents (in gallons).

		Volume		
Tank	Capacity	Liquid	Sludge	Total
V-1	10,000	1,160	520	1,680
V-2	10,000	1,140	460	1,600
V-3	10,000	7,660	650	8,310
V-9	400	70	250	320
Total	30,400	10,030	1,880	11,910

Source: 2003 Technology Evaluation Report (DOE-ID 2003b) (data rounded).

All four tanks were installed in the early 1950s and were used for about 30 years in a system that collected and treated radioactive liquid waste from Test Area North (TAN) operations, beginning with the Aircraft Nuclear Propulsion Program in the 1950s and early 1960s. Waste was piped from the adjacent research facilities into Tank V-9, where some of the solids were removed. The remaining waste was then routed into one or more of the larger tanks (V-1, V-2, and V-3). The tanks' contents are an aqueous sludge contaminated with radionuclides, inorganic contaminants (including metals), and organic compounds, including polychlorinated biphenyls (PCBs). Nearly all of the contaminants in the V-Tanks are associated with the solid phase of the sludge.

During some pumping operations to remove excess liquid from the V-Tanks, there were releases to the ground. However, because most of the contamination was retained in the solid phase, which was still in the tanks, the spilled liquid contained very low concentrations of contaminants. The 1999 ROD identified Cs-137 as the only contaminant of concern in the soil above future residential risk-based levels.

Table 2-2 lists the primary contaminants in the V-Tanks that affect the selection of an effective remedy. That table presents information on the overall average concentration of the V-Tanks system as well as the minimum and maximum concentration of the contents of any one of the four tanks. These values were used in evaluating the effectiveness and operability of various treatment alternatives. The reader is urged to use caution in comparing these data to other sources of information on the V-Tanks or in comparing these values to regulatory levels. The EPA regulations and guidance require different statistical treatment of analytical data based on whether they are being used for risk assessment, waste characterization, acceptability of treatment options, or compliance with disposal facility acceptance criteria. Risk assessments require 95% upper confidence limit (UCL) values. Waste characterization requires 90% UCL values on the amount of material that will leach from the waste in a given timeframe. To determine whether waste is acceptable, treatment facilities usually look at average concentrations along with maximum and minimum values. Compliance with disposal facility waste acceptance criteria (WAC) is usually based on 90% UCL on total concentrations. It is generally inappropriate to compare data supplied for one purpose with data intended for another use. The data in Table 2-2 were compiled to allow the Agencies to select an effective treatment process. Information supporting the risk assessment and waste characterization activities is in the Administrative Record (on the Internet at http://ar.inel.gov).

Treatment of the V-Tanks contents by the selected remedy will significantly reduce the concentrations of the contaminants identified in Table 2-2. Chemical oxidation/reduction is expected to produce a significant reduction in the concentration of organic compounds. The addition of appropriate stabilization agents to the chemically oxidized/reduced waste is required to bind hazardous metals and radionuclides and reduce the leachability and mobility of those materials. The final waste form after oxidation/reduction and stabilization will require further analysis to ensure compliance with disposal facility acceptance criteria.

Currently, the V-Tanks (TSF-09 and TSF-18) are administratively controlled. The area is fenced and posted with signs that identify it as a CERCLA site. No activities can be performed at the V-Tanks without notification of the appropriate INEEL CERCLA program. Entry into the area requires radiological control precautions. The purpose of these controls is to keep worker exposures as low as reasonably achievable (ALARA) and to prevent the spread of contaminated soil. The controls reduce current and future occupational exposure at the V-Tanks to acceptable levels.

Table 2-2. V-Tanks contents contaminants for treatment.[a]

	Concentration[b]		
	Lowest	Highest	Average
Inorganic Contaminants (mg/kg)			
Antimony	0.363	11.5	0.902
Arsenic	0.146c	3.05 [c]	0.359 [c]
Barium	2.11 [c]	299	12.4 [c]
Beryllium	0.258 [c]	20.2	1.11 [c]
Cadmium	0.864 [c]	21.8 [c]	2.34 [c]
Chlorides	74.2	397	106
Chromium	25.8	1,880	297
Lead	12.1 [c]	454	36.1 [c]
Mercury	19.2 [c]	1,670	79.2 [c]
Nickel	4.24 [c]	319	16.4 [c]
Silver	1.18 [c]	522	18.4 [c]
Volatile Organic Compounds (VOCs) (mg/kg)			
Tetrachloroethylene (PCE)	36.3	438	118
1, 1, 1-Trichloroethane (TCA)	0.049	1,770	52.2
Trichloroethylene (TCE)	0.234	14,500	426
Semivolatile Organic Compounds (SVOCs) (mg/kg)			
Bis-2-ethylhexyl phthalate (BEHP)	338.0	919	454
Aroclor-1260 (a PCB)	9.99	95.9	17.9
Radionuclides (nCi/g)			
Cesium-137	528	4,480	988
Strontium-90	1,510	5,180	1,840
Transuranics[d]	2.03	26.4	4.27

a. The V-Tanks also contain minor concentrations of other elements and compounds that are not included in this list because they do not exceed treatment levels or affect the treatment process. However, the amended remedy is designed to treat all of the tanks contents, including these minor constituents.

b. A weighted average based on the mass of the entire V-Tanks contents (all four tanks combined). The "lowest" concentration is the lowest average concentration measured in any single tank for the given contaminant. The "highest" is the highest average concentration measured in any single tank for the given contaminant.

c. Some of the inorganic concentration values reported in the TER were incorrectly calculated by the private laboratory that analyzed the waste. Those values have been corrected and the corrected values included in this table. These changes would not have significantly affected the technology evaluation and selection process.

d. The transuranics include plutonium, americium, curium, and neptunium.

Source: 2003 Technology Evaluation Report (DOE-ID 2003b), with corrections for inorganic contaminants from EDF-3868, "V-Tank Analytical Data: Calculated Averages and Upper Confidence Limits."

A remedy for the V-Tanks was selected in the 1999 ROD for OU 1-10. The original remedy is described in the next section. The Agencies documented changes in the remedies for several OU 1-10 sites, including the V-Tanks, in the *Explanation of Significant Differences for the Record of Decision for the Test Area North Operable Unit 1-10* (DOE-ID 2003a [DOE/ID-11050]) (the 2003 ESD). For the V-Tanks site, the 2003 ESD addressed further characterization of the surrounding contaminated soil and further definition of the corresponding area of contamination (AOC). The ESD also addressed a change to the applicable or relevant and appropriate requirements (ARARs) for PCB remediation waste.

2.2 V-Tanks Original Remedy and Need to Re-Evaluate Other Technology Alternatives

The V-Tanks original remedy selected in the 1999 ROD was Alternative 2, Soil and Tank Removal, Ex Situ Treatment of Tank Contents, and Disposal. Under the original remedy, the tank contents would be removed, placed into containers, and transported to an approved treatment facility off the INEEL. Thermal treatment at the facility would reduce toxicity, mobility, and volume of the contaminants. The treatment residue would either be returned to the INEEL for disposal at the INEEL CERCLA Disposal Facility (ICDF) or disposed of at the Waste Isolation Pilot Plant (WIPP) near Carlsbad, New Mexico, or other approved facility.

The empty tanks and associated piping would be decontaminated, removed, and disposed of at the ICDF or other approved facility. The contaminated soil would be excavated and disposed of at the ICDF or other approved facility. Institutional controls such as signs, access control, and land-use restrictions would be established and maintained as necessary. The estimated capital and maintenance cost for implementing the selected remedy for the V-Tanks in the 1999 ROD was $8,893,348 in net present value (NPV).

To implement the selected remedy, a remedial design/remedial action work plan, the *Comprehensive Remedial Design/Remedial Action Work Plan for the Test Area North, Waste Area Group 1, Operable Unit 1-10, Group 2 Sites* (DOE-ID 2002b [DOE/ID 10875]) (the 2002 RD/RAWP), was issued. Pursuant to the 1999 ROD, the 2002 RD/RAWP called for treating each phase, liquid and sludge, separately. The remedy design included removing and shipping the tank contents to the Allied Technology Group (ATG), an out-of-state commercial treatment (vitrification) facility.

However, the ATG facility stopped offering the thermal treatment called for in the 1999 ROD. In addition, other difficulties with carrying out the remedy selected in the 1999 ROD were revealed during the remedial design process. The remedial design for the V-Tanks cleanup indicated that shipping and treating the tank contents involved more complexities and cost than had been anticipated. To reduce the volume of contaminated material shipped out of state and thereby lower the costs of shipping and treatment off the INEEL, the liquid would need to be separated from the sludge (with the liquid treated on the INEEL and only the sludge shipped off the INEEL). This added more steps to the remedial action. The treatment facility's permit limited the amount of radionuclide-containing waste it could have in inventory at any given time. This meant that the INEEL would have to ship the waste in multiple, timed shipments instead of all at once, adding delays to the project schedule. While waiting for shipment, the sludge would have to be stored at the INEEL. This added more steps to the process, and would also require special containers for storage that have to be expensively disposed of after use. Also, the high levels of radionuclides would require special casks for shipping.

Even if an approved treatment facility had been available, these complications would have increased the total cost of the project by over $21 million, making it approximately $32.2 million instead of the original $11.2 million (in Fiscal Year [FY] 1999 dollars; $8.9 million in 1999 net present value

[NPV]). This change in cost not only eliminated the cost advantage that had favored selection of this remedy, but also contributed to the Agencies' decision to look for a different remedy. Consequently, a decision was made to re-evaluate other viable technology alternatives.

2.3 V-Tanks Technology Evaluation Process

The technology evaluation focused on currently viable technologies. Initial screening of technologies is described in the *Technology Evaluation Scope of Work for the V-Tanks* (DOE-ID 2002a). The characterization assumptions that were used for the technology evaluation and comparative analysis are listed in Table 2-3. Table 2-4 lists the treatment assumptions.

In order to be thorough, technologies previously considered in the Comprehensive Remedial Investigation/Feasibility Study (RI/FS) (DOE-ID 1997) were also reviewed and screened. For each potential alternative, preconceptual designs were developed. The designs included process flow diagrams and associated mass balances in sufficient detail to allow development of an approximate schedule and a preconceptual cost estimate (+50%, -30%). The cost estimates consider all pertinent costs (those associated with RD/RAWP issuance, waste disposal, historical costs, transportation, etc.) to ensure a comprehensive life-cycle estimate.

Mass balances for the primary and secondary waste streams were developed to ensure compliance with requirements of the appropriate treatment, storage, and disposal facilities. Sufficient information was developed to evaluate the various technology alternatives relative to the CERCLA criteria.

A decision support model was used to facilitate objective selection of the preferred alternative. That model was modified from one developed at the INEEL in 2000 for modeling, structuring, scoring, and evaluating remedial alternatives for CERCLA sites (INEEL 2000a). The model uses cost data, implementation data, and performance data to compare remedial alternatives. The method can easily incorporate analysis of key site characterization and performance uncertainties. The agencies participated in the application of the model to the V-Tanks contents treatment alternatives, assigning relative weights to each factor used in the analysis.

Table 2-3. Characterization assumptions for the V-Tanks contents.

The characterization assumptions for the V-Tanks contents include the following:

- Waste in the V-Tanks has undergone previous RCRA characterization. The V-Tanks contents are characterized as RCRA code F001, due to the spent halogenated solvent (trichloroethylene [TCE]) used in degreasing during TAN operations.
- The V-Tanks waste is characteristically hazardous, which invokes the full list of underlying hazardous constituents. Therefore, for example, polychlorinated biphenyls (PCBs) require treatment to the 10-ppm land disposal restriction (LDR) limit, and bis(2-ethylhexyl)phthalate (BEHP) requires treatment to the 28-ppm LDR limit for disposal of the primary waste form at the INEEL CERCLA Disposal Facility (ICDF).
- All secondary waste from each treatment alternative will be characterized as F001 listed due to the "derived-from" rule.
- Primary and secondary waste (F001 listed) that meets LDRs will be considered for disposal at the ICDF.
- Secondary waste (F001 listed) that does not meet LDRs and that cannot be practically treated on the INEEL, in accordance with the treatment alternative mass balances, will be sent off the INEEL for treatment and/or disposal.
- (Source: 2003 Technology Evaluation Report [DOE-ID 2003b].)

Table 2-4. Treatment assumptions for the V-Tanks contents.

- The treatment assumptions for the V-Tanks contents include the following:
- For comparative analysis purposes, all proposed remediation technologies will be initiated after 6,000 gal of liquid supernatant have been removed from Tank V-3.
- The ICDF will open in July 2003 and will be available to receive V-Tank waste in 2005, when the remedial action is projected to take place.
- The Agencies will approve the applicable or relevant and appropriate requirements (ARARs) associated with Resource Conservation and Recovery Act (RCRA) alternative treatment standards and Toxic Substances Control Act (TSCA) risk-based petitions.
- Design and treatment operations will be performed to meet "clean closure" requirements.
- The Allied Technology Group (ATG) will remain a nonviable alternative for treatment of the V-Tanks waste. No other treatment off the INEEL will be available before 2005.
- Delisting of the V-Tanks contents as hazardous waste will not be pursued.
- The Nevada Test Site (NTS) or Hanford Reservation will be accepting out-of-state mixed waste for treatment/disposal by 2007.
- The Waste Isolation Pilot Plant (WIPP) will be accepting remote-handled waste by 2007.
- Soil additions for various treatment alternatives (e.g., vitrification and thermal desorption) are acceptable to ensure proper process operations.
- Thermal desorption is approved by the EPA as a type of retort.
- Macro-encapsulation can be performed on those off-gas units that are not granular in form (such as high-efficiency particulate air [HEPA] filters), provided other waste acceptance criteria (WAC) are met (e.g., less than 500 ppm total organic carbon for the ICDF).
- Macro-encapsulation cannot be performed on those off-gas units that are granular in form (such as granular-activated carbon [GAC] and sulfur-impregnated granular-activated carbon [SGAC] filters). As a result, those off-gas units can be disposed of at the ICDF only if they meet land disposal restrictions (LDRs).
- Organic destruction efficiencies demonstrated during treatability studies will be achieved during actual chemical oxidation/reduction of V-Tank waste.
- V-Tank waste is considered a single waste stream for the purposes of establishing necessary treatment requirements.
- Building TAN-616 will be removed down to its foundation by the time remediation is initiated.
- Buildings other than TAN-616 surrounding TSF-09 and TSF-18 will not be affected by the remedial action and removal of TAN-616.
- The contents of all four V-Tanks can be slurried and removed without additional liquid.
- Equipment for transferring the slurried V-Tank sludge and liquid phases will require temporary shielding and secondary containment. Equipment used for decanting V-Tank liquid, before slurrying, only requires secondary containment.
- Maximum achievable control technology (MACT) emission standards only apply to the off-gas treatment system used for the vitrification and thermal desorption alternatives on the INEEL.
- Contamination control during excavation of contaminated soil can be managed by maintaining slightly damp soil conditions, placing wind restrictions on operations, using temporary tarps, etc., as opposed to large temporary containment structures.
- All equipment coming in contact with the waste or its residuals during processing might have to be disposed of at the ICDF as debris. However, an effort will be made to recover or reuse as much of this equipment as possible before disposing of it as debris waste.
- (Source: 2003 Technology Evaluation Report [DOE-ID 2003b].)

2.4 Summary of Retained Technologies for the V-Tanks

The following list summarizes those primary and secondary treatment technologies that were retained through the screening process and incorporated into the 2003 Technology Evaluation Report (TER) (DOE-ID 2003b). Primary technologies represent the primary treatment process that would be applied to the tank contents. The primary technologies considered were vitrification, thermal desorption, and chemical oxidation/reduction followed by stabilization. Secondary technologies are those that would be used in conjunction with the primary technology to treat secondary waste streams, such as carbon adsorption and off-gas filtration.

Specific alternatives associated with each technology, for which formal, detailed evaluations were conducted, are summarized below:

- In situ vitrification with disposal of the primary and the majority of the secondary waste streams at the ICDF
- Ex situ vitrification at the V-Tanks site with disposal of the primary and most of the secondary waste streams at the ICDF
- Thermal desorption at the V-Tanks site with disposal of residue at the ICDF and treatment and disposal of the secondary waste streams off the INEEL
- Thermal desorption at the V-Tanks site with disposal of residue at the ICDF and treatment and disposal of the secondary waste streams on the INEEL
- Thermal desorption at the V-Tanks site with disposal of stabilized residue off the INEEL and treatment and disposal of the secondary waste streams off the INEEL
- In situ chemical oxidation/reduction followed by stabilization with disposal of the primary and the majority of the secondary waste streams at the ICDF
- Ex situ chemical oxidation/reduction at the INEEL followed by stabilization with disposal of the primary and the majority of the secondary waste streams at the ICDF.

2.5 Key Documents for V-Tanks Activities

The goals and results of activities relating to OU 1-10 that have been completed to date are reported in the key documents in Table 2-5. For the reader's convenience, the document number (e.g., DOE/ID-10682) is listed. Either the title or the document number can be used to locate the document in the Administrative Record. The Administrative Record is available online at http://www.inel.gov/publicdocuments/ or at http://ar.inel.gov, or at the Information Repositories listed in Section 1. In addition, documents that are included in the Administrative Record are listed in Appendix B, Administrative Record Index.

Table 2-5. Key documents related to V-Tanks activities.

Referred to as	Date	Title	Document/ AR No.
1997 RI/FS	Nov 97	*Comprehensive Remedial Investigation/Feasibility Study for the Test Area North Operable Unit 1-10 at the Idaho National Engineering and Environmental Laboratory*	DOE/ID-10557
November 1998 Proposed Plan	Nov 98	*Proposed Plan for Waste Area Group 1 Test Area North, Idaho National Engineering and Environmental Laboratory*	AR No. 10553
1999 ROD	Oct 99	*Final Record of Decision for Test Area North, Operable Unit 1-10*	DOE/ID-10682
2000 RD/RA SOW	Feb 00	*Test Area North Waste Area Group 1 Operable Unit 1-10 Remedial Design/Remedial Action Scope of Work (SOW)*	DOE/ID-10723
2002 RD/RAWP	March 02	*Comprehensive Remedial Design/Remedial Action Work Plan for the Test Area North, Waste Area Group 1, Operable Unit 1-10, Group 2 Sites*	DOE/ID-10875
2002 Technology Evaluation SOW	Jul 02	*Technology Evaluation Scope of Work for the V-Tanks, TSF-09/18, at Waste Area Group 1, Operable Unit 1-10*	DOE/ID-10999
2002 Fact Sheet	Aug 02	"New Alternatives Considered for V-Tanks at Waste Area Group 1," *Update Fact Sheet*	AR No. 24774
2003 TER	Apr 03	*Technology Evaluation Report for the V-Tanks, TSF-09/18, at Waste Area Group 1, Operable Unit 1-10*	DOE/ID-11038
2003 ESD	Apr 03	*Explanation of Significant Differences for the Record of Decision for the Test Area North Operable Unit 1-10*	DOE/ID-11050
2003 Proposed Plan	Apr 03	*New Proposed Plan for the V-Tanks Contents (TSF-09 and TSF-18) at Test Area North, Operable Unit 1-10*	AR No. 24783

3. COMMUNITY PARTICIPATION

Public participation was an important element in the decision-making process for the V-Tanks contents remedial action. Public participation also resulted in the significant change to the HTRE Reactor Vessel Burial Site that is chiefly documented in Section 11. In accordance with CERCLA Section 113(k)(2)(B)(i–v) and Section 117, the Agencies provided various opportunities for the public to learn about the activities leading to this V-Tanks ROD Amendment and to provide their opinions and comments for the Agencies' consideration in making the final decision. Between August 2002 and May 2003, a series of publications and face-to-face (or telephone) meetings offered information and comment opportunities to the public, including stakeholder groups. These opportunities included the 2002 Fact Sheet, the 2003 ESD, the 2003 Proposed Plan, briefings and presentations to interested groups, and public meetings, as follows:

Reports in *EM Progress* in 1999, 2000, 2001, 2002, and 2003 provided updates to the approximately 600 individuals on the INEEL Community Relations mailing list during the course of the project.

In August 2002, an Update Fact Sheet, "New Alternatives Considered for V-Tanks at Waste Area Group 1" (INEEL 2002), was distributed to individuals on the mailing list. The fact sheet described the V-Tanks technology evaluation and announced the time frame for future public meetings. It also included information on the availability of technical briefings to those interested in the V-Tanks Remedial Action.

In April 2003, the *New Proposed Plan for the V-Tanks Contents (TSF-09 and TSF-18) at Test Area North, Operable Unit 1-10* was published (DOE-ID, EPA, and IDEQ 2003). About 600 copies were mailed out to recipients on the INEEL Community Relations mailing list during the week of April 7, 2003. The public comment period for the 2003 Proposed Plan began April 15 and ended May 14.

During the week of April 7, 2003, the INEEL Community Relations representative for TAN telephoned individuals in various Idaho communities who were known to have an interest in INEEL environmental restoration activities. The calls were made to inform them and their organizations in advance about the Proposed Plan, to provide the schedule for the public meeting, and to find out whether they wanted a technical briefing.

Also during the week of April 7, 2003, the DOE Idaho Operations Office (then referred to as DOE-ID [see footnote a]) issued a news release to more than 100 media contacts. The news release announced the 30-day public comment period for the Proposed Plan. This information was published in community calendar sections of newspapers and aired in public service announcements on radio stations. The news release also included information that reference documents for the Proposed Plan were available in the Administrative Record section of the INEEL Information Repositories located in the INEEL Technical Library in Idaho Falls and Albertsons Library on the campus of Boise State University. During the following week, display advertisements announcing the availability of the Proposed Plan and the locations of public meetings were published in the *Post Register* (Idaho Falls), the *Arco Advertiser* (Arco), *The Sho-Ban News* (Fort Hall), *The Idaho State Journal* (Pocatello), *The Times-News* (Twin Falls), the *Idaho Statesman* (Boise), and the *Moscow-Pullman Daily News* (Moscow). A follow-up advertisement ran in newspapers approximately four days before the public meeting in Idaho Falls. Post cards were mailed to approximately 5,400 individuals and organizations on the INEEL mailing list informing them of the availability of the Proposed Plan, the duration of the comment period, and the time and location of upcoming public meeting. An electronic note with this information was sent to all INEEL employees.

Technical briefings were provided to five groups:

- On April 11, 2003, a technical briefing was held for Coalition 21, an Idaho-based advocacy group for "support of nuclear technology" and INEEL's nuclear mission. Coalition 21 had also received a previous briefing in September 2002.

- On April 15, 2003, a technical briefing was held for Snake River Alliance (SRA), an Idaho environmental group whose mission includes seeking "the end of nuclear weapons production activities and solutions to nuclear waste and contamination," particularly INEEL activities that may pose risk to the Snake River Plain Aquifer. The SRA had also received a previous briefing in October 2002.

- On April 16, 2003, a technical briefing was held at Fort Hall, Idaho, for members of the Shoshone-Bannock Tribes. (The Shoshone-Bannock Tribes' representative to the Citizens Advisory Board also attended the following public meeting on April 30.)

- On April 17, 2003, a briefing was held by conference call for Keep Yellowstone Nuclear Free (KYNF), an environmental organization based in Jackson, Wyoming. The KYNF had also received a previous briefing in October 2002. The KYNF's mission is "to stop the creation of hazardous and radioactive air contamination, and any further proposals for nuclear waste incineration, by the INEEL."

- Several briefings, including a conference call on April 30, were provided by the DOE Idaho Operations Office (then DOE-ID [see footnote a]) for the INEEL Citizen's Advisory Board and its Environmental Restoration Subcommittee. The advisory board is a group of 15 individuals, selected to represent Program the citizens of Idaho, who make recommendations to the Agencies regarding environmental restoration activities at the INEEL. The advisory board submitted a recommendation on the V-Tanks remediation activities in January 2003.

A public meeting was held in Idaho Falls on April 30, 2003. The public meeting began at 7 p.m. The newspaper advertisements had invited the public also to attend the "availability session" scheduled from 6 to 7 p.m. Availability sessions are opportunities for informal discussion of the technology evaluation and proposed alternatives with Agency and project representatives before the formal public meeting began. At the meeting, a court reporter recorded discussions and public comments from which written transcripts were later prepared and placed into the Administrative Record for OU 1-10.

Those who attended the meeting were invited to have their comments recorded by the court reporter during the formal comment portion of the meeting, or submit them in writing, or both. A postage-paid, preaddressed form for comments was provided as part of the Proposed Plan. Copies of the form also were provided at the public meeting.

Approximately 10 members of the public or representatives of stakeholder groups (individuals not associated with the OU 1-10 project) attended the Idaho Falls public meeting or the availability session or both.

During the comment period, seven separate sets of formal comments were received—six submitted in writing and one delivered as a formal comment at the public meeting. Part III of this ROD Amendment, the Responsiveness Summary, consists of a summary of the concerns expressed in the comments received, and the Agencies' responses to them. Transcripts of the formal comments delivered at the public meetings and scanned versions of comments received in writing are provided in Appendix A to this ROD Amendment and ESD. The comments are in the Administrative Record for OU 1-10.

All comments received on the 2003 Proposed Plan were considered during the remedy selection process documented in this ROD Amendment and ESD. Community acceptance, as one of the EPA's nine criteria used in final evaluation of remedial alternatives, is documented in Section 7.1 of this ROD Amendment. Public comments also supported the addition of institutional controls for the Reactor Vessel Burial Site (TSF-06, Area 10). These changes are documented in Sections 10 and 11 of this ROD Amendment and ESD.

4. BASIS FOR THE AMENDMENT TO THE V-TANKS

Pursuant to the 1999 ROD, the original remedy for the V-Tanks included removing the V-Tanks contents and shipping them to an out-of-state commercial treatment (vitrification) facility. In early 2002, however, the only available treatment facility, ATG, stopped accepting waste for thermal treatment. No other approved facility is currently available for treating these wastes in accordance with the remedy selected in the 1999 ROD. While other facilities may become available in the future, it is not known whether or when any of these facilities could treat the V-Tanks contents.

Other difficulties with carrying out the remedy selected in the 1999 ROD were revealed during the original remedial design process. The remedial design for the V-Tanks cleanup indicated that shipping and treating the tank contents involved more complexities and cost than had been anticipated. To reduce the volume of contaminated material shipped out of state and thereby lower the costs of shipping and treatment off the INEEL, the liquid would need to be separated from the sludge (with the liquid treated on the INEEL and only the sludge shipped off the INEEL). This added more steps to the remedial action. The treatment facility's permit limited the amount of radionuclide-containing waste it could have in inventory at any given time. This meant that the INEEL would have to ship the waste in multiple, timed shipments instead of all at once, adding delays to the project schedule. While waiting for shipment, the sludge would have to be stored at the INEEL. This added more steps to the process, and would also require special containers for storage that would have to be expensively disposed of after use. Also, the high levels of radionuclides would require special casks for shipping. Even if an approved treatment facility had been available, these complications would have increased the total cost of the project by over $21 million, making it approximately $32.2 million instead of the original $11.2 million (in Fiscal Year [FY] 1999 dollars; $8.9 million in 1999 NPV). This change in cost not only eliminated the cost advantage that had favored the selection of this remedy, but also contributed to the Agencies' decision to look for a different remedy.

Based on these facts, the Agencies decided to reevaluate technologies previously considered and develop additional alternatives so that a new remedy for the V-Tanks contents could be selected. In particular, the new set of alternatives focused on identifying multiple, currently available, cost-effective, safe, and feasible treatment, storage, and disposal options. The reevaluation and decision process is summarized in the 2003 TER (DOE-ID 2003b).

5. REMEDIAL ACTION OBJECTIVES

For the V-Tanks, remedial action objectives (RAOs) were defined in the 1999 ROD for two categories of concern: soil pathways and the tank contents. (Note: No changes are being made to the RAOs for the PM-2A Tanks or the HTRE Reactor Vessel Burial Site.)

5.1 V-Tanks Remedial Action Objectives Defined in the 1999 Record of Decision

The RAOs described in the 1999 ROD are based on the results of the human health risk assessment and are specific to the contaminants of concern (COCs) and exposure pathways developed for OU 1-10. The 1999 ROD describes the exposure pathways for all OU 1-10 sites:

- "The current and future occupational scenarios include soil ingestion, inhalation of fugitive dust, and inhalation of volatiles routes of exposure for soils from 0 to 6 in. in depth."
- "The current and future occupational scenarios include the external radiation exposure pathway for soils from 0 to 4 ft in depth."
- "The future residential scenario begins in 100 years. It includes all soil pathway and air pathway exposure routes for soils from 0 to 10 ft in depth."
- "The future residential scenario also includes all groundwater pathway exposure routes, where all sample results are included, regardless of depth."

The following RAO for the soil pathway was identified in the ROD as specific to the V-Tanks site:

- "Reduce risk from external radiation exposure from Cs-137 to a total excess cancer risk of less than 1 in 10,000 for the hypothetical resident 100 years in the future and the current and future worker."

The 1999 ROD assigned the following additional RAO as specific to the V-Tanks site:

- "Prevent release to the environment of the V-Tank contents."

To meet the soil RAOs, Final Remediation Goals (FRGs) were established in Table 6-1 of the 1999 ROD. The objective of the FRGs is to ensure risk-based protection of human health and the environment by providing unrestricted land use in 100 years. Table 6-1 of the 1999 ROD indicates that Cs-137 was the only COC identified for the soils surrounding the V-Tanks that would pose an unacceptable risk after 2099. The table notes that no risk assessment was performed on the tank contents because the tanks were not incorporated into the site until the Feasibility Study phase. Hence, the only identified COC, Cs-137, is based on the soil data that was available at that time. The 1999 ROD established the FRG as 23.3 pCi/g for Cs-137.

5.2 Refinement of V-Tanks Remedial Action Objectives

In accordance with the 2003 ESD, additional soil characterization around and beneath the level of the bottom of the V-Tanks was conducted in the 2003 field season. This soil sampling primarily focused on areas beyond and below previous sampling efforts to identify the extent of contamination. The COCs being tested for in the soil sampling were based on the contaminants identified in the tanks. Results of the sampling will not be final until early 2004.

If new COCs are identified in the soils surrounding the V-Tanks, a new FRG will be determined for each COC, based on the same assumptions and methodology used in the OU 1-10 RI/FS. The FRGs will be calculated such that the cumulative risk from all of the soil COCs will not exceed a carcinogenic risk of 1 in 10,000 and a cumulative hazard index of 1 for the exposure pathways described in the 1999 ROD. The new FRGs, if any, will be presented and justified in the new RD/RAWP for the V-Tanks, to be prepared following this ROD Amendment.

Because it is not known whether additional COCs will be identified in the soil during the upcoming characterization, the RAOs for the V-Tanks have been changed to the following:

- Reduce risk from all pathways and all COCs to a total excess cancer risk of less than 1 in 10,000 and a total hazard index of less than 1 for the hypothetical resident 100 years in the future and for the current and future worker

- Prevent release to the environment of the V-Tank contents.

5.3 Responsiveness to Risk of V-Tanks Remedial Action Objectives

The RAOs will prevent current and future exposure to COCs that could result in a carcinogenic risk in excess of 1 in 10,000, and a cumulative hazard index in excess of 1.

The RAOs will be accomplished through a combination of remedial action and institutional controls. Institutional controls at the V-Tanks site will be necessary to control access to the site for at least 100 years. As specified in the 1999 ROD, if soils containing concentrations of COCs greater than the FRGs remain in place, institutional controls may be necessary after 100 years to prevent future contact with those soils.

6. DESCRIPTION OF THE V-TANKS ORIGINAL REMEDY AND THE NEW ALTERNATIVES

This section summarizes the original remedy and the new alternatives and describes the common elements and the distinguishing features. The evaluation of new alternatives included reconsideration of the No Action and Limited Action (institutional controls) alternatives. Both were rejected because they would leave contaminants in tanks not designed for indefinite storage. However, institutional controls, which are a part of Limited Action, were retained as a component of the cleanup action. More complete details of the original remedy can be found in the 1999 ROD (DOE-ID 1999a). More complete details about the new alternatives can be found in the 2003 TER (DOE-ID 2003b).

6.1 V-Tanks Original Remedy

The original remedy selected in the 1999 ROD was Alternative 2, Soil and Tank Removal, Ex Situ Treatment of Tank Contents, and Disposal. The major components of the selected remedy were as follows:

- Excavating contaminated soil
- Disposing the contaminated soil at an approved soil repository
- Sampling tank contents
- Removing tank contents and placing the contents into U.S. Department of Transportation (DOT) approved containers
- Transporting the tank contents and other investigation-derived waste (IDW) to a treatment facility off the INEEL
- Treating tank contents and IDW at an approved Resource Conservation and Recovery Act (RCRA) and Toxic Substances Control Act (TSCA) mixed waste treatment facility
- Disposing of treated tank contents and IDW at the ICDF, other approved facility, or WIPP
- Decontaminating the tanks and removing the tanks for disposal
- Post-remediation soil sampling at the bottom of the excavation to verify FRGs are met and to analyze for additional contaminants in the V-Tanks contents waste, in order to perform a risk analysis in support of an institutional control determination at this site
- Filling the excavated area with clean soil (soil that meets remedial action goals), then contouring and grading to surrounding soil
- Establishing and maintaining institutional controls consisting of signs, access control, and land-use restrictions, depending on the results of post-remediation sampling.

The estimated capital and maintenance cost for implementing the selected remedy for the V-Tanks in the 1999 ROD was $8,893,348 NPV.

6.2 Technology 1—Vitrification

Vitrification uses electricity to heat waste to temperatures high enough to melt the waste into a glass-like material as hard as basalt or obsidian. Through vitrification, many contaminants, including radionuclides and most metals, are bound up into the glass and permanently immobilized. Volatile and semivolatile contaminants are either destroyed by the heat or driven off as gas that is then captured and treated. To the extent possible, the contaminated piping and soil associated with the V-Tanks would be incorporated into the melt. Vitrification of the V-Tanks would include construction of an off-gas system to capture and treat volatilized contaminants. After vitrification, the glass would be disposed of at the ICDF. Contaminated soil, tanks, and piping not incorporated in the vitrified waste would be removed and disposed of at the ICDF, as described under the original remedy. Two variations of vitrification were considered, differing in whether the vitrification takes place in situ or ex situ.

6.2.1 Alternative 1(a)—In Situ Vitrification

For *Alternative 1(a) In Situ Vitrification*, an in situ vitrification system would be deployed, complete with the associated off-gas cleanup system. In this process, graphite electrodes would be inserted into the soil around the tank to melt the waste in place. Sufficient current would then be passed initially through a conductive starter path between electrodes, then through the melting soil and, ultimately, through a molten mass incorporating soil, the tank, and the waste contents to form a relatively homogeneous vitrified mass. The type of melt conducted is referred to as a planar melt, in which the melt takes place at the level of the V-Tanks (10 to 20 ft below grade), eventually incorporating the tank and waste, but allowing vapors to emerge to the surface. Before beginning the melting process, soil (and possibly other absorbent fill material) would be added to the tanks. Existing tank lines and portals would be enlarged, as necessary, to direct and capture most of the off-gases above the ground, thereby precluding subsurface pressure buildup. A large hood would be placed over the area to capture the off-gases, which would be treated through various wet (or dry) scrubber systems, filters, and a thermal oxidizer/reducer before being discharged. Granular-activated carbon (GAC) and sulfur-impregnated granular activated carbon (SGAC) filters would be used to remove organics and mercury, respectively, from the off-gases. The off-gas would be treated to meet maximum achievable control technology (MACT) requirements. Secondary waste scrubber solutions would be generated, treated, and then disposed of at the ICDF.

Following vitrification of the tank system, the vitrified mass would be broken into pieces, removed from the ground, and disposed of at the ICDF. The surrounding soil would be excavated and disposed of at the ICDF, as required. Clean soil would be used to backfill the area of contamination. The selected vendor would establish the exact number of melts, but it could range from one melt, if all of the sludge were first consolidated into one tank, to four melts, if each tank were treated separately. For this preconceptual design, it was assumed that one consolidated melt would be conducted. Other waste material (e.g., piping) potentially could be incorporated into the melt.

For purposes of estimating the mass balance around the in situ vitrification process, characterization data from other in situ vitrification applications were extrapolated as a basis for assuming that water and VOCs would be vented from the waste during the initial heating produced by melting the soil around the tanks. These vapors would be caught in the off-gas system as liquid condensate or adsorbed onto activated carbon. Semivolatile organic compounds (SVOCs) would be pyrolized and destroyed in the melting process. Cadmium, chlorides, and mercury would be vaporized from the melt and captured in the condensate, the high-energy particulate air (HEPA) filters, or in sulfur-impregnated carbon. The majority of the inorganics (including metals and radionuclides) will be incorporated into the glass matrix. Only trace concentrations of these constituents are expected to partition to the off-gas treatment system. Only the carbon beds, due to their relatively high content of volatile organic compounds (VOCs), would be disposed of off the INEEL; all other materials would be disposed of at the ICDF.

6.2.2 Alternative 1(b)—Ex Situ Vitrification

In *Alternative 1(b)—Ex Situ Vitrification*, the tanks' contents would be combined and homogenized and then transferred into a nearby aboveground vitrification unit. The vitrification unit would be pre-insulated to preclude melting the container during ex situ vitrification processing. Then, soil from the area would be added concurrently with the tank contents to provide the proper mix.

Graphite electrodes would be used, as described in Alternative 1(a), to vitrify the waste. However, in this application, all of the melting would occur inside the prefabricated vitrification unit, and the V-Tanks themselves would not be incorporated. The process would include an off-gas cleanup system comparable to the one required for in situ vitrification, and would produce comparable waste streams for disposal. The solidified mass contained in the prefabricated container(s) would be directly disposed of at the ICDF.

To the extent possible, other waste (such as piping and soil) would be incorporated into each melt. Then, the tanks and other contaminated soil would be removed and disposed of at the ICDF. Finally, the area of contamination would be backfilled with clean soil.

6.3 Technology 2—Thermal Desorption

Thermal desorption uses heat at a moderate temperature to separate the volatile and nonvolatile contaminants into two waste streams. Separating the contaminants into two waste streams provides more remediation options than would be available for just one waste stream containing all the contaminants. Additional treatments are required to destroy organic constituents, such as PCBs, and amalgamate the mercury (as required).

Under all variations of this technology, the tanks' contents would be pumped into a thermal desorption unit at the V-Tanks site and heated to a moderate temperature to remove VOCs, SVOCs, and mercury. The bottoms, which would contain the nonvolatile contaminants (including most of the metals and radionuclides), would be treated by stabilization (as required) and disposed of. Stabilization would not be required if soil were added during the desorption process. The off-gas system would destroy volatilized contaminants or capture them for treatment. Under all variations of this technology, the tanks and associated piping would be excavated and disposed of at the ICDF. Three variations of thermal desorption were considered, differing in whether the treatment and disposal steps are carried out on the INEEL, off the INEEL, or with a combination of *on* and *off* the INEEL. (Note to readers: For greater clarity, the titles of the alternatives were changed to reflect this type of wording, using "on the INEEL" or "off the INEEL" rather than "on-Site" and "off-Site.")

The alternatives also differ in whether contaminated soil from the V-Tanks area of contamination (AOC) would be added to the desorber. Thermal desorption has been used successfully elsewhere in the U.S. to treat contaminated soil, but has rarely been used on extremely moist materials such as the sludge in the V-Tanks. Alternatives 2(a) and 2(b) would add the contaminated soil to the sludge to lower the moisture content. This would prevent clumping and uneven heating, resulting in faster drying in the desorber unit. Under Alternative 2(c), the sludge would be treated without the addition of soil.

6.3.1 Alternative 2(a)—Thermal Desorption with Disposal Both On and Off the INEEL (formerly, *Thermal Desorption with Both On-Site and Off-Site Disposal*)

Under *Alternative 2(a)—Thermal Desorption with Disposal Both On and Off the INEEL*, the V-Tank contents would be transferred to the thermal desorption unit and combined with soil from the area of contamination.

Initially, liquid and sludge waste would be removed from each V-Tank in batches and placed directly into the thermal desorption unit, where it would be combined with soil sufficient to adjust moisture levels to within the normal operating range of the thermal desorption unit. Once the soil/waste has been received, the thermal desorption unit would be set in rotation and heated for 1 hour at 95°C (200°F) at 620 mm Hg. During this period, 100% of the water and low-boiling point organic contaminants and about 20% of the mercury would be desorbed. Following low-temperature operations, a vacuum (40 mm Hg) would be established on the rotating vessel, and the unit would be heated for 2 hours at up to 400°C (750°F). It is during this period that 100% of the SVOCs and the remaining mercury would be desorbed.

As in vitrification, a relatively sophisticated off-gas system would be used to collect and treat the off-gas. Since thermal desorption operates at lower temperatures than vitrification, cesium levels in the off-gas system would be reduced. Partitioning of contaminants would be similar to the vitrification process in that VOCs would be captured in the off-gas condensate and on activated carbon, and mercury would be adsorbed on sulfur-impregnated carbon. However, cadmium would not be volatilized, due to the lower operating temperature. The SVOCs would also be captured in the off-gas condensate and on the activated carbon. These slightly radioactive off-gas waste streams (condensate and filters) would be containerized and shipped off the INEEL for treatment and disposal.

After 2 hours at 400°C (750°F), the waste containing most of the heavy metals and radionuclides would be cooled and transferred to the hopper vessel for containerization. Based on the mass balances, this material would not be expected to require stabilization; it would be containerized and disposed of at the ICDF. The tanks and remaining soil would also be disposed of at the ICDF.

6.3.2 Alternative 2(b)—Thermal Desorption with Disposal On the INEEL (formerly, *Thermal Desorption with On-Site Disposal*)

Under *Alternative 2(b)—Thermal Desorption with Disposal On the INEEL*, a thermal desorption system would be used identical to that in Alternative 2(a), but the off-gas system would be modified to include organic destruction, which facilitates treatment of all secondary waste on the INEEL. This process uses a thermal oxidizer/reducer, which would be located at TSF, for destroying the organics.

Rather than collecting the organic constituents on carbon beds, they would be destroyed by the thermal oxidizer/reducer as they are desorbed. All waste products from this alternative could be disposed of at the ICDF.

6.3.3 Alternative 2(c)—Thermal Desorption with Disposal Off the INEEL (formerly, *Thermal Desorption with Off-Site Disposal*)

Alternative 2(c)—Thermal Desorption with Disposal Off the INEEL would eliminate the use of soil in the desorber, allowing a smaller unit to be used, resulting in waste products suitable for treatment and disposal off the INEEL (at the Nevada Test Site [NTS], for example).

As in the previous thermal desorption alternatives, liquid and sludge waste would be removed from each V-Tank and placed directly into the thermal desorption unit, but no carrier soil would be employed. This would minimize the residual waste volume, but also maximize the radiological concentration. The staged desorption process would be identical to that described in Alternative 2(a) in its use of an off-gas system without organic destruction on the INEEL. Partitioning of the desorbed constituents among the secondary waste streams would, therefore, be similar to the first thermal desorption alternative, although the volume of water collected would be reduced since additional soil would not be added.

After 2 hours at 400°C (750°F), the inorganic waste containing most of the heavy metals and radionuclides would be cooled and transferred to the hopper vessel for containerization. After containerization, the waste would be placed in interim storage and later shipped to a disposal facility off the INEEL, such as WIPP, NTS, or the Hanford Reservation. In the event that transuranic levels met WIPP criteria, the residue would be stored without stabilization. If, as expected, the transuranic levels were below WIPP criteria (<100 nCi/g, which is expected based on the material balance), the residue would be stabilized to meet land disposal restrictions (LDRs) and comply with NTS and Hanford waste acceptance criteria and radiological licenses. Currently, these facilities are accepting only mixed waste from within their respective states while pursuing the capability to receive out-of-state waste. Since they are not currently authorized to accept V-Tank waste, it is assumed that the waste (inorganic bottoms/residue) would be placed in interim storage on the INEEL until authorization were granted.

The secondary off-gas waste streams would be treated and disposed of at other facilities off the INEEL, as in Alternative 2(a). The tanks and soil would be sent to the ICDF for disposal.

6.4 Technology 3—Chemical Oxidation/Reduction with Stabilization

For chemical oxidation/reduction with stabilization, a chemical oxidant/reductant would be added to the tanks' contents to destroy the organic contaminants, including PCBs. If necessary, the tank contents could be heated to boiling temperatures to facilitate destruction. An off-gas system would be used to capture and recycle volatilized contaminants back into the reaction, increasing destruction efficiencies. After oxidation/reduction, the tanks' contents would then be chemically neutralized and the metals and radionuclides stabilized with grout or a similar material. The stabilized waste would be disposed of at the ICDF. The contaminants captured in the off-gas and the filters used in the off-gas system would be disposed of at the ICDF or an approved facility off the INEEL. The tanks and piping, along with the remaining contaminated soil, would be excavated and disposed of at the ICDF. Two variations of this technology were considered, differing in whether chemical oxidation/reduction and stabilization takes place in situ or ex situ. For the purposes of the technology evaluation, a chemical oxidation/reduction process was considered. However, during remedial design, it may be determined that chemical oxidation/reduction is a more appropriate technology. Thus, this alternative is described as oxidation/reduction with stabilization.

6.4.1 Alternative 3(a)—In Situ Chemical Oxidation/Reduction with Stabilization

Under *Alternative 3(a)—In Situ Chemical Oxidation/Reduction with Stabilization*, the treatment would run as a batch process in which waste is consolidated as practicable to facilitate oxidation/reduction. For the purposes of the evaluation process, it was assumed that the contents of Tank V-9 would be added to Tank V-2 prior to processing.

To complete the preconceptual designs that provided the basis for the comparative analysis, it was necessary to assume a specific oxidant/reductant—in this case, sodium persulfate. However, other oxidants/reductants, such as Fenton's reagent (hydrogen peroxide) or ozone, may be specified during the design phase.

Under this alternative, the pH of the tank contents would be adjusted and controlled with sodium hydroxide and nitric acid to facilitate the oxidation/reduction process. Persulfate would be added in progressive steps to chemically oxidize/reduce the various organic constituents. Temperatures would be managed to maintain control of the reaction and to achieve the desired destruction level.

Upon completion of the reaction step, the oxidized/reduced liquid waste would be analyzed for key contaminants (e.g., bis-2-ethylhexyl phthalate [BEHP]) to verify whether sufficient destruction and removal efficiencies (DREs) have been achieved. Once adequate destruction efficiency is achieved, the pH would be checked and adjusted, as necessary, to facilitate stabilization to (1) stabilize the remaining inorganic contaminants, metals, and radionuclides, and (2) eliminate free liquid so the resulting solid can be sent to the ICDF for disposal. Sampling and analysis of grouted waste would be completed to verify compliance with regulatory standards (e.g., LDRs) before disposal. The tanks and surrounding soil would then be removed and disposed of at the ICDF.

The condenser would be used to capture any water or contaminants (e.g., VOCs, mercury) evaporated during the oxidation/reduction step. The condensate would be continuously recycled back to the tank to increase destruction of any VOCs. Any VOCs not condensed would be captured on a GAC filter that would be treated and disposed of at a treatment, storage, and disposal facility off the INEEL, since VOC concentrations are expected to exceed the ICDF's waste acceptance criteria. If there were residual mercury vapors, they would be captured on a SGAC filter that could be disposed of at the ICDF, since it is expected to meet the ICDF's waste acceptance criteria.

6.4.2 Alternative 3(b)—Ex Situ Chemical Oxidation/Reduction with Stabilization

Under *Alternative 3(b)—Ex Situ Chemical Oxidation/Reduction with Stabilization*, the chemical oxidation/reduction process used would be identical to that described for Alternative 3(a), maintaining the relative benefits of contamination control in a low-temperature liquid process, while conducting the treatment ex situ in a reaction vessel designed for this application. The vessel would minimize concerns with efficient heating, mixing, and corrosion control, because it could be designed specifically to facilitate the operation of the ex situ chemical oxidation/reduction system. As with in situ chemical oxidation/reduction, a specific oxidant/reductant (persulfate) was identified, but other oxidants/reductants could be selected during the design phase.

For this alternative, in order to facilitate treatment operations, the waste from the V-Tanks would be consolidated and blended to the extent practicable into the minimum number of tanks to produce a single homogenous waste stream. Relatively small batches of this homogenous waste would be withdrawn from the V-Tanks for treatment in appropriately sized reaction vessels. Once in the reaction vessel, the waste would be stirred vigorously. Before and during chemical oxidation/reduction, the stirred tank waste would be adjusted and maintained at a controlled pH, as necessary, to enhance the chemical oxidation/reduction reaction. The chemical oxidant/reductant would be introduced to the stirred tank in stages to allow for oxidation/reduction of tank contents in a batch-processing manner. The initial stage would focus on the VOCs; thus, it would be preferable to minimize the reaction vessel's temperature during this time. Later stages would focus on oxidation/reduction of the SVOCs (such as PCBs and oil components), which could require heating to ensure sufficient destruction.

During chemical oxidation/reduction, there could be significant volatilization of hazardous VOCs into the off-gas system, despite operation at a low temperature (less than 100°C). To attempt a more complete oxidation/reduction, the volatized organics would be condensed, with the condensate recycled back to the reaction vessel. The GAC, SGAC, and HEPA filters between the condenser and the off-gas blower would be used to fully capture noncondensing hazardous off-gases and particulate to prevent release to the environment.

Once a batch chemical oxidation/reduction is complete, the reaction vessel's contents would be transferred and mixed with cementitious grout for stabilization purposes. Stabilization would be performed in the same container used for disposal. Upon removing the chemically oxidized/reduced waste from the reaction vessel, it would be recharged with another batch of well-mixed tank sludge. This would continue until the entire contents of the tanks have been oxidized/reduced and stabilized. The containerized, stabilized waste would be sampled to verify compliance with ICDF waste acceptance criteria and would be disposed of at the ICDF. The empty tanks and surrounding soil would then be removed and disposed of at the ICDF.

6.5 Common Elements of the V-Tanks Alternatives

All of the new alternatives considered include some of the same components. All the alternatives will result in the removal of the tank contents, the tanks, and associated piping. Likewise, all alternatives are compatible with the retained portion of the original selected remedy — removal and disposal of contaminated soil — as clarified in Section 11.2 of this ROD Amendment. The clarification specifies that the current FRGs will be applied in a different manner for soil to a depth of 3 m (10 ft) below ground surface (bgs) and soil more than 3 m (10 ft) bgs. Soil exceeding the Cs-137 FRG of 23.3 pCi/g and above 3 m (10 ft) bgs will be excavated, and any portion of it not incorporated in the treatment process will be disposed of at the ICDF or other approved facility. Soil exceeding the Cs-137 FRG of 23.3 pCi/g that is more than 3 m (10 ft) bgs will have appropriate institutional controls applied. If there is evidence of a release from the V-Tanks or the associated piping, then the underlying soils will be sampled and analyzed for the V-Tank contaminants to support a risk analysis that supports a potential revision to the FRGs and a determination of the need for further actions. This determination could lead to application of institutional controls, further remediation, or no action.

For all alternatives, the portions of the tanks and piping not incorporated in the treatment process will be disposed of at the ICDF or other approved facility. Personal protective equipment and nonrecoverable materials and equipment (items that cannot be easily or cost effectively decontaminated for reuse) will be treated as necessary and also disposed of at the ICDF or other approved facility. Institutional controls for the V-Tanks site will be maintained if contamination remaining at the site precludes unrestricted land use after completion of the remedial action. The excavated area will be backfilled with clean soil after cleanup is complete.

The estimated cost for each alternative is presented as part of the evaluation. Estimated costs are in net present value (NPV), with an estimated accuracy of +50% to -30%. Actual project costs for V-Tanks remediation through September 2002 are $6.0 million. Cost estimates provided for each alternative include the actual costs through September 2002.

All alternatives require institutional controls to protect current and future users from health risks associated with the V-Tank contents prior to remediation and with residual soil contamination remaining after remediation, if any. Consistent with expectations set out in CERCLA (40 Code of Regulations [CFR] 300), none of the remedies rely exclusively on institutional controls to achieve effectiveness. Detailed information and requirements for institutional controls are addressed in the 1999 ROD.

6.6 Distinguishing Features of the V-Tanks Alternatives

The expected outcomes are not substantively changed as a result of this ROD Amendment. The remedy selected in this ROD Amendment will produce an equivalent level of cleanup to the remedy selected in the 1999 ROD. Both remedies remove all the waste from the tanks, treat them to meet LDR treatment requirements and ICDF or other suitable disposal facility WAC limits. The primary distinguishing feature of the remedy selected in this ROD Amendment is that control of the treatment process is maintained at the INEEL, reducing the risk of commercial treatment facilities choosing alternative business strategies that affect the availability of selected treatment alternatives.

Although the remedy for the soils is not altered in intent from the 1999 ROD or from the 2003 Proposed Plan to this ROD Amendment, it is being modified for greater clarity, as noted in Section 6.5, above, and detailed in Section 11.2. As specified in the 1999 ROD, institutional controls will be implemented and maintained by the DOE at the V-Tanks site if residual contamination precludes unrestricted land use after completion of remedial action.

The cost of the new remedy selected in this ROD Amendment is roughly equivalent to the increased level of costs for the 1999 ROD remedy as estimated just before that technology became unavailable and forced the development of this ROD Amendment. However, because the 1999 ROD selected remedy is not available, remediation of the V-Tanks site has been delayed by approximately 4 years.

There were no major changes to the ARARs. The EPA promulgated remediation waste rules that simplify operation of remediation treatment and storage systems, but generally mirror the existing requirements. Other ARARs such as the ARARs specific to PCBs also were clarified. Neither of these changes dramatically alters the basis of the remedy or its overall protectiveness.

7. EVALUATION OF V-TANKS ALTERNATIVES

This section compares the performance of each alternative with respect to the CERCLA evaluation criteria, in order to make clear their relative advantages and disadvantages. The alternatives are evaluated for each of the nine criteria in turn, which are grouped into three sets:

- Threshold criteria (which must be met for an alternative to be considered for selection)
  - Overall Protection of Human Health and the Environment
  - Compliance with Applicable or Relevant and Appropriate Requirements
- Balancing criteria
  - Long-Term Effectiveness and Permanence
  - Reduction of Toxicity, Mobility, or Volume through Treatment
  - Short-Term Effectiveness
  - Implementability
  - Cost
- Modifying criteria
  - State/Support Agency Acceptance
  - Community Acceptance.

For the first four balancing criteria, the decision support model developed in the technology evaluation process yielded scores that were detailed in Section 5 of the 2003 TER and summarized in Section 6 and Table 18 of the 2003 TER. The variance between summary scores for several alternatives was small. A relative evaluation also was made to further assist in selection of the preferred alternative, primarily due to the closeness of the scores of the alternatives from the decision support model (INEEL 2000a). The evaluation of alternatives below presents these scores as high, medium, or low rankings, with additional details as needed to identify comparative advantages and disadvantages within these rankings. The last of the five balancing criteria, Cost, is evaluated in terms of estimated net present value cost of each alternative.

For the reasons described in Sections 2 and 4, the original selected remedy for the V-Tanks contents is infeasible. Therefore, its performance is not included in the comparative evaluation below, but is summarized here as a baseline. As originally evaluated in the 1999 ROD, the original selected remedy (Soil and Tank Removal, Ex Situ Treatment of Tank Contents, and Disposal) would have met the threshold criteria for protection of human health and the environment and compliance with ARARs. Its long-term effectiveness was ranked high because the contamination would have been removed from the V-Tanks site. The reduction of toxicity, mobility, or volume through treatment was ranked high because VOCs and SVOCs would be destroyed, volatile metals would be removed, and the remaining metals and radionuclides would be immobilized. The short-term effectiveness was ranked low, due to the complexity of worker protection measures, uncertainties regarding acceptance criteria at disposal facilities off the INEEL, and the risks to communities during shipment off the INEEL. State acceptance was signified by

IDEQ signature of the ROD, and public comments registered general acceptance by the community. However, if this alternative were evaluated today, the ranking for implementability would be low because of the lack of an available facility for treatment, and its cost would be nearly three times that estimated in the 1999 ROD, making it higher than four of the seven alternatives evaluated here, at approximately $32.2 million.

The technology evaluation indicated that of all the alternatives considered, the amended remedy using Ex Situ Chemical Oxidation/Reduction with Stabilization best meets the evaluation criteria. The evaluation of alternatives summarized here is based on data presented in the 2003 TER. The full evaluation of the original selected remedy can be found in the 1999 ROD.

7.1 Evaluation Criteria

The evaluation of alternatives in this section is limited to the alternatives for the V-Tanks contents only. All alternatives are equally effective in removing contaminated soil from the V-Tanks site. No significant change is proposed from the 1999 ROD with respect to the remedy for the contaminated soil, although it is being modified for clarity.

7.1.1 Threshold Criteria

Threshold criteria are requirements that an alternative must meet to be eligible for selection as the final remedy. The threshold criteria are (1) overall protection of human health and the environment, and (2) compliance with ARARs.

7.1.1.1 Overall Protection of Human Health and the Environment. This criterion addresses whether an alternative provides adequate protection of human health and the environment and describes how risks posed through exposure pathways are eliminated, reduced, or controlled through treatment, engineering controls, or institutional controls. As a threshold criterion, this must be met for an alternative to be eligible for detailed evaluation and selection.

All of the alternatives are protective of human health and the environment by preventing release to the environment of the V-Tanks contents. Furthermore, the treatment processes can be engineered to ensure that workers and the environment are protected during active remediation.

7.1.1.2 Compliance with Applicable or Relevant and Appropriate Requirements (ARARs). This criterion requires that remedial actions at CERCLA sites at least meet legally applicable or relevant and appropriate federal and state requirements, standards, criteria, and limitations (collectively referred to as ARARs), as required by Section 121(d) of CERCLA and the NCP Section 300.430(f)(1)(ii)(B). As a threshold criterion, this must be met for an alternative to be eligible for selection.

All of the alternatives would meet their respective ARARs. Section 9 lists ARARs for the amended remedy.

7.1.2 Balancing Criteria

The five balancing criteria serve to weigh major tradeoffs between alternatives. They are: (1) long-term effectiveness and performance, (2) reduction of toxicity, mobility, or volume through treatment, (3) short-term effectiveness, (4) implementability, and (5) cost. Since lack of implementability was the reason the remedy selected in the 1999 ROD required amendment, the Agencies gave this criterion considerable weight in the selection process.

7.1.2.1 Long-Term Effectiveness and Permanence.
This criterion refers to expected residual risk and the ability of a remedy to maintain reliable protection of human health and the environment over time. This criterion includes consideration of residual risk that will remain on the INEEL following remediation, and the adequacy and reliability of controls.

All seven alternatives provide high long-term effectiveness and permanence by removing the contamination from the V-Tanks site.

7.1.2.2 Reduction of Toxicity, Mobility, or Volume through Treatment.
This criterion addresses the statutory preference for selecting remedial actions that employ treatment technologies which permanently reduce toxicity, mobility, or volume of the COCs.

Alternative 1(a)—In Situ Vitrification has the only high ranking for reduction of toxicity, mobility, and volume through treatment. It would destroy or treat VOCs and SVOCs, capture volatile metals (such as mercury) in the off-gas system, and immobilize the remaining metals and radionuclides. Incorporation of some soil, part of the tank shells, and some of the piping into the melt would increase the volume of the vitrified waste, but vitrification would treat some contaminated soil that otherwise would be excavated and disposed of without treatment.

Alternative 1(b)—Ex Situ Vitrification has a moderate ranking for reduction of toxicity, mobility, and volume through treatment. As with Alternative 1(a), VOCs and SVOCs would be destroyed or treated, volatile metals (such as mercury) would be captured in the off-gas system, and the remaining metals and radionuclides would be immobilized. Vitrification would treat some contaminated soil that otherwise would be excavated and disposed of without treatment. The addition of contaminated soil would reduce the volume of soils disposed of without treatment. However, ex situ processes require substantial amounts of treatment equipment, some of which could not be decontaminated and would need to be disposed of as secondary waste or in conjunction with the primary waste.

Alternative 2(c) Thermal Desorption with Disposal Off the INEEL has a moderate ranking for reduction of toxicity, mobility, and volume through treatment. It would treat VOCs and SVOCs captured in the off-gas system. Volatile metals (such as mercury) that are captured would be stabilized as necessary. The residual waste from the desorber would be grouted to stabilize toxic metals to meet disposal facility acceptance criteria. This would reduce the mobility of the contaminants with only a slight increase in volume.

Ranking of the remaining four alternatives for reduction of toxicity, mobility, or volume through treatment is low. Under *Alternatives 2(a)—Thermal Desorption with Disposal Both On and Off the INEEL and 2(b)—Thermal Desorption with Disposal On the INEEL*, VOCs and SVOCs captured in the off-gas system would be treated, and volatile metals (such as mercury) that are captured would be stabilized as necessary. However, the mobility of the remaining metals and radionuclides in the bottoms would not be affected. Although water is driven off by the thermal processing, the volume of the bottoms would increase due to the addition of soil in the desorption process. *Alternatives 3 (a In Situ Chemical Oxidation/Reduction with Stabilization and 3(b)—Ex Situ Chemical Oxidation/Reduction with Stabilization*, would reduce toxicity by destroying the VOCs and SVOCs through oxidation/reduction and would reduce mobility of metals and radionuclides through grouting. However, 3(a) and 3(b) would increase the volume of waste requiring disposal by adding the oxidizing/reducing and neutralizing chemicals and the grout.

7.1.2.3 Short-Term Effectiveness.
Short-term effectiveness evaluates the amount of time until the remedy effectively protects human health and the environment at the V-Tanks site. It also evaluates any adverse effects that may be posed to workers, the community, or the environment

during construction and operation while the remedial activity is being carried out. All of the alternatives with the exception of *Alternative 2(c)—Thermal Desorption with Disposal Off the INEEL* accomplish the remedial action during the same timeframe. Alternative 2(c) would require interim storage on the INEEL before disposal of the final waste form.

The highest degree of short-term effectiveness is offered by *Alternatives 3(a)—In Situ Chemical Oxidation/Reduction with Stabilization, 3(b) Ex Situ Chemical Oxidation/Reduction with Stabilization, and 2(b)—Thermal Desorption with Disposal On the INEEL*. Under Alternative 3(a), in situ processing minimizes potential risks to workers and the environment. Most treatment processes would take place on the INEEL, minimizing risks to communities off the INEEL. The technology's relative simplicity reduces complexity in worker protection measures. The relative simplicity and low temperatures of Alternative 3(b) make worker-protection measures less complicated. In addition, most or all treatment processes would take place on the INEEL, minimizing risks to communities off the INEEL. As an ex situ process, this alternative would pose slightly more risks to workers than an in situ process. Alternative 2(b), like 3(a) and 3(b), has high short-term effectiveness because all treatment and disposal processes would take place on the INEEL, avoiding risks to communities off the INEEL. However, under 2(b) there are potential worker exposure hazards from materials handling and dust created during the process.

Alternatives 1 (a)—in Situ Vitrification, 1(b)—Ex Situ Vitrification, and 2(a)—Thermal Desorption with Disposal Both On and Off the INEEL offer moderate short-term effectiveness. The vitrification processes of Alternatives 1(a) and 1(b) involve high energy and high temperature, which could pose risks to workers that are complex to manage. Most processes would take place on the INEEL, however, minimizing risks to communities off the INEEL. Since Alternative 1(b) treatment takes place above ground, worker exposure hazards are increased. The moderate ranking for short-term effectiveness of Alternative 2(a) is due to its potential worker exposure hazards from materials handling and dust, as well as shipping, which could pose risks to communities off the INEEL.

Alternative 2(c)—Thermal Desorption with Disposal Off the INEEL has the lowest ranking for short-term effectiveness, because it would pose potential worker exposure hazards from materials handling, from dust created during the process, and from high radiation levels. Additionally, 2(c) calls for shipping off the INEEL, which could pose risks to communities.

7.1.2.4 Implementability. The criterion of implementability addresses the technical and administrative feasibility of a remedy from design through construction and operation. Factors such as availability of services and materials, and coordination with other governmental entities, are also considered.

Implementability is high for *Alternatives 2(a) Thermal Desorption with Disposal Both On and Off the INEEL, 2(b)—Thermal Desorption with Disposal On the INEEL, 3(a)—In Situ Chemical Oxidation/Reduction with Stabilization, and 3(b)—Ex Situ Chemical Oxidation/Reduction with Stabilization.* For 2(a) and 2(b), the prevalent use of thermal desorption would enhance implementation; however, application of this technology to radioactive materials has been limited, and this lack of experience adds design and operating complexities. The technology is moderately complex but has good recovery; that is, the treatment technology may be easily adjusted if the initial treatment does not fully satisfy objectives. Under 2(b), treatment on the INEEL of contaminants in the off-gas would add to the process complexity. However, since all wastes would be disposed of on the INEEL, availability of disposal facilities would be more assured. For 2(a), shipment of organic contaminants off the INEEL for treatment would reduce regulatory and operational complexity. Alternatives 3(a) and 3(b), are given a high implementability ranking because the systems and equipment involved have a high technical reliability with relatively few major components, and with the flexibility of the technology there is excellent recovery. Design of in situ treatment under 3(a), however, would involve some complexities associated with integrity of the tank once the chemical solution is added, in-tank heating and mixing issues, and removal and transport of the grout-filled tanks. Alternative 3(b) minimizes the issues of tank integrity, heating and mixing, and dealing with grout-filled tanks. As an ex situ process, it would resolve the technical uncertainties associated with in situ treatment. The maturity of the chemical oxidation/reduction technology for this type of application is limited; thus, additional testing will be required to confirm previous treatability studies (INEEL 1998).

Alternatives 1(a)—In Situ Vitrification and 1(b)—Ex Situ Vitrification have only moderate implementability. In situ vitrification has been successfully implemented on similar sites, and disposal facilities are available, but it is a relatively complicated process with complex recovery and monitoring considerations. Alternative 1(b) would require portable temporary vitrification units, which are not widely used, and the process is relatively complicated with complex recovery and monitoring considerations.

The lowest implementability ranking is for *Alternative 2(c)—Thermal Desorption with Disposal Off the INEEL*. Although the desorption technology called for under this alternative is widely used, it has not been previously carried out on high-radiation sludges. Recovery would be relatively complex. If an approved disposal facility off the INEEL is not available when needed, final completion of the cleanup could be delayed or even precluded, with costs commensurately increased.

7.1.2.5 Cost. The estimated life-cycle costs (in NPV using a 7% discount rate) for the alternatives are, in order of lowest to highest: \$29.4 million for 3(b), \$29.5 million for 3(a), \$30.3 million for both 2(a) and 2(b), \$32.7 million for 1(b), \$33.0 million for 1(a), and \$33.8 million for 2(c). These costs were calculated as planning estimates during preparation of the 2003 TER. Since that time, a remedy has been selected by the Agencies and the cost estimate for that selected remedy was updated for use in this ROD Amendment (see Section 8.2). Because of the expenditure required to update a cost estimate, no updates were made for the alternatives not selected. The costs presented in this ROD Amendment are considered accurate to +50% and –30%. Details of the cost estimates are presented in Appendix A of the 2003 TER. Due to the closeness of these estimates, cost was not a major discriminator in the final selection.

7.1.3 Modifying Criteria

Modifying criteria are fully considered after public comment on the proposed plan is received. The two modifying criteria are (1) state acceptance and (2) community acceptance. The modifying criteria are used in final evaluation of remedial alternatives and are equal in importance to the balancing criteria.

7.1.3.1 State Acceptance. State acceptance is demonstrated by IDEQ concurrence with the selected remedial alternative and signature of this ROD Amendment. The IDEQ was involved in the development and review of the 2003 TER and the 2003 Proposed Plan (as described in Section 2 of this ROD Amendment), as well as this ROD Amendment and other project activities such as public briefings and meetings.

7.1.3.2 Community Acceptance. For community acceptance, the factors that are considered include those elements of the remedial alternatives that interested persons in the community support, have reservations about, or oppose.

In general, commenters expressed support for both the alternatives and the evaluation process. Overall concerns most often mentioned include: (a) assurance of long-term effectiveness and protectiveness, (b) use of reliable and fully tested technology, and (c) continued public involvement and information.

Community response to the vitrification alternatives included strong support and strong opposition. Two commenters or groups questioned the technology's reliability and safety, and another group opposes vitrification as "nothing more than a proxy for incineration," which they strongly oppose. However, two other commenters support vitrification, citing its high ranking for reduction of toxicity, mobility, or volume, and its long-term effectiveness.

No specific comments for or against the thermal desorption alternatives were received. However, one commenting group made clear their general disfavor of thermal technologies, because of the likelihood of off-gassing and airborne emissions.

Community support for the preferred alternative, Ex Situ Chemical Oxidation/Reduction with Stabilization, was generally favorable, with its low-temperature and ability to treat the complex mixture of wastes cited as advantages, as well as its use of ex situ processing to avoid problems with tank safety. One commenting group opposes it because of its low ranking for reduction of toxicity, mobility, and volume. Several commenters and groups expressed concerns about the legality of adding grout for land disposal, the adequacy of the proposed off-gas system to prevent accidental releases into the atmosphere, and whether enough treatability studies would be carried out to prove the technology prior to full implementation. The Responsiveness Summary (Part III) portion of this ROD Amendment documents the full range and content of the public comments received regarding the recommended action.

7.2 Comparison of V-Tanks Alternatives

Alternative 3 (b) Ex Situ Chemical Oxidation/Reduction with Stabilization is preferred over the other alternatives because it is a low-temperature operation, uses a simplified off-gas treatment system, and generates a stabilized waste form that can be disposed of at the ICDF. A comparison to other alternatives follows:

- Compared to *Alternative 1(a)—In Situ Vitrification*, the preferred alternative has fewer potential hazards to workers, fewer monitoring concerns, lower costs, higher system reliability, and less off-gas waste production. These advantages more than offset Alternative 1(a)'s relative strengths of technology maturity, less primary waste volume, and increased treatment capability for investigation-derived waste.

- Compared to *Alternative 1(b) Ex Situ Vitrification*, the preferred alternative has fewer potential hazards to workers, lower costs, and higher system reliability.

- Compared to *Alternative 2(a)—Thermal Desorption with Disposal Both On and Off the INEEL*, the preferred alternative produces a lower volume of off-gas wastes, requires fewer shipments off the INEEL, and presents fewer potential hazards to workers. These advantages more than offset Alternative 2(a)'s greater administrative feasibility.

- Compared to *Alternative 2(b)—Thermal Desorption with Disposal On the INEEL*, the preferred alternative poses fewer potential hazards to workers, offers higher system reliability, and produces a lower volume of off-gas wastes.

- Compared to *Alternative 2(c)—Thermal Desorption with Disposal Off the INEEL*, the preferred alternative poses fewer potential hazards to workers, uses readily available disposal facilities, has a lower cost, requires fewer shipments off the INEEL, and offers better system reliability.

- Compared to *Alternative 3(a)—In Situ Chemical Oxidation/Reduction with Stabilization*, the preferred alternative has equal system reliability and fewer design complexities.

Table 7-1 shows how the alternatives compare under each criterion.

Table 7-1. Cost decision support model

Table 7-1. The table represents the quantified results of a decision support model that was developed collaboratively by the Agencies during the technology evaluation. The model used more than 20 subcriteria to numerically evaluate the performance of various technologies against the five CERCLA balancing criteria. Because the technologies had been carefully selected for optimum viability, they performed well in the decision support model evaluation and generated very close numerical rankings. The evaluation of alternatives in Section 7.1 and the comparison of alternatives in Section 7.2 are based on the results of the decision support model. The final numerical rankings, which discriminate more precisely than the visual representation below, are described in detail in Sections 4 and 5 of the 2003 Technology Evaluation Report.

	Vitrification		**Thermal Desorption**			**Chemical Oxidation/Reduction with Stabilization**	
	In Situ 1(a)	*Ex Situ* 1(b)	*Disposal Both On and Off the INEEL* 2(a)	*Disposal On the INEEL* 2(b)	*Disposal Off the INEEL* 2(c)	*In Situ* 3(a)	☑ *Ex Situ* 3(b)
Threshold Criteria [a]							
Overall protection	Ⓨ	Ⓨ	Ⓨ	Ⓨ	Ⓨ	Ⓨ	Ⓨ
Compliance with laws	Ⓨ	Ⓨ	Ⓨ	Ⓨ	Ⓨ	Ⓨ	Ⓨ
Balancing Criteria							
Long-term effectiveness	●	●	●	●	●	●	●
Reduction of toxicity, mobility, or volume through treatment	●	◒	○	○	◒	○	○
Short-term effectiveness	◒	◒	◒	●	○	●	●
Implementability	◒	◒	●	●	○	●	●
Cost (in millions) [b]							
Capital costs	$32.7	$32.4	$30.0	$30.0	$33.5	$29.2	$29.1
Operating and maintenance costs [c]	0.3	0.3	0.3	0.3	0.3	0.3	0.3
Total Cost	$33.0	$32.7	$30.3	$30.3	$33.8	$29.5	$29.4

Note: The Original Selected Remedy was Soil and Tank Removal, Ex Situ Treatment of Tank Contents, and Disposal. However, the alternative is no longer viable, prompting development of a new remedy.

☑ Indicates the preferred alternative
Ⓨ Yes, meets criterion
● High, most satisfies criterion
◒ Moderate, satisfies criterion
○ Low, least satisfies criterion

a. An alternative must meet the threshold criteria to be considered for selection. An alternative either fully satisfies the criteria or does not. The No Action and Limited Action (Institutional Controls) alternatives did not meet the threshold criteria and were eliminated from detailed analysis.
b. Costs are estimated and rounded. Costs are in net present value, with an estimated accuracy of +50% to -30%. Detailed cost estimates are in Appendix A of the 2003 Technology Evaluation Report. Cost estimates provided for each alternative include the costs to date.
c. The only operating and maintenance costs required would be for institutional controls and would be identical for all alternatives, since all alternatives would remove contamination in order to meet remediation goals.

8. V-TANKS AMENDED REMEDY

The amended remedy for the V-Tanks contents is Chemical Oxidation/Reduction with Stabilization. This remedy applies chemical oxidation/reduction processes that provide the relative benefits of contamination control in a low-temperature liquid process. The final design of the ex-situ V-Tanks contents treatment process is expected to include aqueous-phase destruction of the organic COCs enhanced by gaseous-phase destruction of the VOCs. A simplified process flow diagram for treatment of the V-Tanks contents under the amended remedy is shown in Figure 8-1. Final details of the treatment process will be provided in the remedial design.

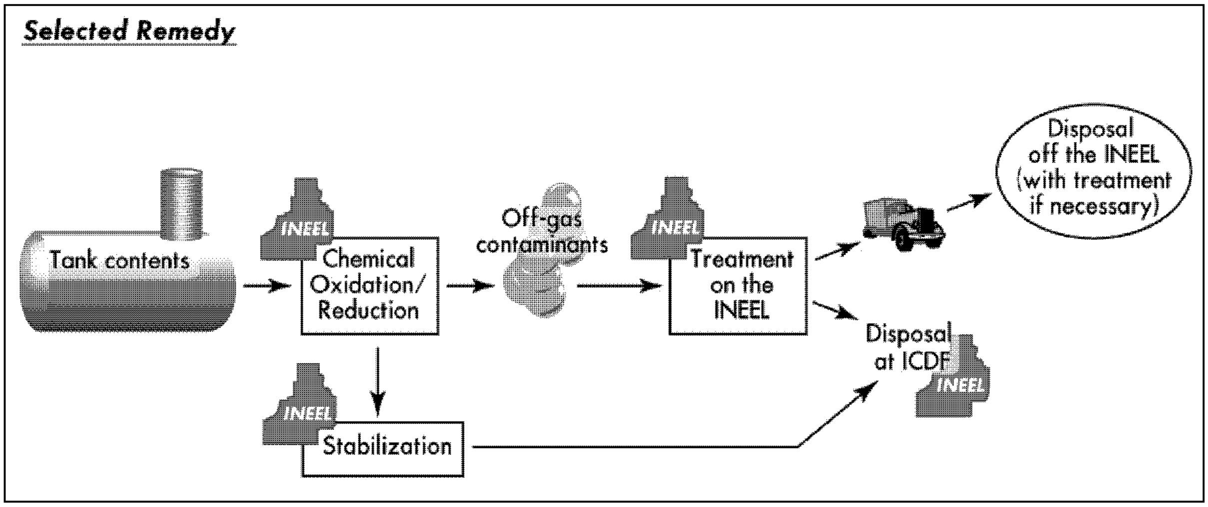

Figure 8-1. Simplified process flow diagram for the V-Tanks contents under the amended remedy.

The complete amended remedy for the V-Tanks (TSF-09 and TSF-18) is Soil and Tank Removal, Chemical Oxidation/Reduction with Stabilization of Tank Contents, and Disposal. The major treatment activities will take place at the V-Tanks site or areas adjacent (e.g., TAN 607), as necessary to facilitate remediation. The amended remedy will prevent unacceptable current and future exposure of workers, the public, and the environment to contaminants in the V-Tanks. This remedial action will permanently reduce the toxicity and mobility of the contamination in the V-Tanks. It will meet the final RAOs by removing the source of contamination and, thus, break the pathway by which a future receptor may be exposed. This will be the final action for this site. The portion of the amended remedy that addresses removal and treatment of the V-Tanks contents will address the principal threat posed by the V-Tanks contents.

Under this amended remedy, the V-Tanks contents will be chemically oxidized/reduced to the extent necessary to meet treatment standards in accordance with ARARs and then solidified in order to meet ICDF or other approved disposal facility WAC. The ICDF was designated by the Agencies in the *Final Record of Decision for the Idaho Nuclear Technology and Engineering Center, Operable Unit 3-13* (DOE-ID 1999b) as an appropriate disposal facility for all INEEL-generated CERCLA waste that meets the ICDF's WAC. This amended remedy meets the ARAR (40 CFR 761.61[c]) for a risk-based approach to remediation of the V-Tanks contents. Finally, pursuant to the original remedy selected in the 1999 ROD and refined in the 2003 ESD, the surrounding contaminated soil, the tanks, and debris will be removed and disposed of at the ICDF. The FRG for soil surrounding the V-Tanks is 23.3 pCi/g for Cs-137.

The amended remedy for the V-Tanks (TSF-09 and TSF-18) consists of 15 components divided into three subsets—(1) new or modified components of the amended remedy, (2) components of the original remedy that are clarified and remain in effect, and (3) components identified in the 2003 ESD that remain in effect, as follows:

New or Modified Components of the V-Tanks Amended Remedy

1. Further sampling and/or analysis of the V-Tanks contents to support refinement of the RCRA characteristic evaluation to determine whether treatment is required for underlying hazardous constituents. The results of this step will be subject to review and concurrence by the Agencies.

2. Consolidating and/or blending of the tank contents to facilitate management of the waste as one homogenous waste stream to the extent practical. If laboratory studies on sludge treatment demonstrate a clear benefit, some of the liquid excess to the treatment process may be decanted and treated separately from the remainder of the waste.

3. Continued temporary use of Tank V-9 for storage until the contents of that tank are removed for transfer to another V-Tank. Continued temporary use of Tanks V-1, V-2, and V-3 without secondary containment for storage of waste prior to treatment, blending waste prior to treatment, and/or for providing an accumulation location for treated waste prior to stabilization.

4. Chemically oxidizing/reducing the VOCs in the V-Tanks contents as necessary to meet applicable RCRA LDR F001 treatment standards in accordance with ARARs as well as ICDF or other approved disposal facility WAC. Chemical oxidation/reduction of PCBs will be performed as necessary to demonstrate no unreasonable risk to human health and the environment, as part of a PCB risk-based management strategy developed under 40 CFR 761.61(c). Chemical oxidation/reduction will be required for specific underlying hazardous constituents (e.g., BEHP) if the waste is confirmed to exhibit a RCRA characteristic. Laboratory studies will be conducted to optimize the choice of specific oxidant(s)/reductant(s) (e.g., peroxide) and to optimize the treatment process. The treatment process selected may be multi-stage and will be conducted ex situ at the V-Tanks site or areas adjacent (e.g., TAN 607) as necessary to facilitate remediation.

5. Additional treatment (e.g., solidification, stabilization) of the V-Tanks contents as necessary to meet ICDF or other approved disposal facility WAC.

6. Disposing of the treated tank contents at the ICDF or other approved facility.

7. Removing and disposing of the V-Tanks and associated piping at the ICDF or other approved facility.

8. Shipping treatment system off-gas residues and other secondary wastes to the ICDF or an approved treatment facility as necessary based on the off-gas residue characterization.

Components from the V-Tanks Original Remedy that are Clarified

9. Excavating contaminated soil:

   - Excavating contaminated soil surrounding the V-Tanks that exceeds the FRG to a maximum of 3 m (10 ft) below ground surface (bgs)

- Excavating additional soil below 3 m (10 ft) bgs to the extent necessary to remove the V-Tanks and associated piping.

10. Disposing of the contaminated soil at an approved soil repository.

11. Post-remediation soil sampling to verify that FRGs are met and to analyze for additional contaminants if excavation indicates a release of the V-Tanks contents:

    - For contaminated soil less than 3 m (10 ft) bgs, post-remediation sampling to verify that FRGs are met.

    - For contaminated soil more than 3 m (10 ft) bgs, post-remediation sampling to determine the need for institutional controls.

    - For contaminated soil beneath the V-Tanks and piping where there is evidence of a release (either a leak from a V-Tank or the associated piping), post-remediation soil sampling at the bottom of the excavation to analyze for V-Tanks contaminants to support a risk analysis that supports a potential revision to the FRGs and a determination of the need for further actions. This determination could lead to application of institutional controls, further remediation, or no action.

    - For contaminated soil beneath the V-Tanks and piping where there is no evidence of a release from either the V-Tanks or the associated piping, post-remediation soil sampling to determine the appropriate institutional controls, if any, for this site.

12. Filling the excavated area with clean soil (soil that meets RAOs) and then contouring and grading to the surrounding elevation.

13. Establishing and maintaining institutional controls consisting of signs, access controls, and land-use restrictions, depending on the results of post-remediation sampling. Institutional controls will be required if residual contamination precludes unrestricted land use after completion of remedial action.

Components from the 2003 ESD for the V-Tanks

14. Further characterizing the surrounding contaminated soil and further defining the corresponding area of contamination.

15. Adding ARARs for managing PCB remediation waste (as described in Section 9).

The RAOs for the V-Tanks site will be met through the completion of active remediation (projected for 2007) and implementation of institutional controls. As stated in the 1999 ROD, the amended remedy continues to address the risks posed by the V-Tanks by effectively removing the source of contamination and, thus, breaking the pathway by which a future receptor may be exposed.

8.1 Institutional Controls for the V-Tanks

The institutional controls identified in the 1999 ROD for the TSF-09 and TSF-18 V-Tanks are not changed. The 1999 ROD specifies institutional control requirements and requires that institutional controls be implemented and maintained by the DOE at any CERCLA site at the INEEL where residual contamination precludes unrestricted land use.

The 1999 ROD also states that a comprehensive approach for establishing, implementing, enforcing, and monitoring institutional controls at the INEEL, including WAG 1, will be developed in accordance with EPA's *Region 10 Final Policy on the Use of Institutional Controls at Federal Facilities* (EPA 1999a). More detailed information and requirements for WAG 1 institutional controls are included in the 1999 ROD.

8.2 Cost Estimate for the V-Tanks Amended Remedy

The estimated life-cycle cost in NPV for the amended remedy is $32.6 million. Table 8-1 summarizes the *V-Tanks ROD Amendment Cost Estimate* (INEEL 2004). The estimated cost presented incorporates further scope and estimate development for the selected remedy since the comparative estimates were prepared for each of the evaluated technologies (see Section 7.1.2). The planning estimate summarized in Table 8-1 has been updated from the earlier comparative estimate based on the *Conceptual Design Report for Ex Situ Chemical Oxidation/Reduction and Stabilization of the V-Tanks at Waste Area Group 1, Operable Unit 1-10* (INEEL 2003) and detailed planning for fiscal year 2004. The NPV was calculated using a discount rate of 7%. The accuracy range of this estimate is +50% to –30%.

8.3 Expected Outcomes for the V-Tanks Amended Remedy

The Agencies' goal in this action is to remove the tanks and their contents from the V-Tanks site, thereby preventing potential release of contaminants to the environment. The amended remedy will result in attainment of the remediation goals and protection of current and future workers and future residents.

Table 8-1. Cost estimate summary for the V-Tanks amended remedy.

	Actual Cost Through FY 03	Estimated Cost	Contingency [a, b] (percent)		Total Cost FY 03 Dollars	Summary Cost FY 03 Dollars	Summary Cost NPV Dollars
CAPITAL COSTS							
FFA/CO MANAGEMENT AND OVERSIGHT						**$ 3,911,438**	**$ 3,882,712**
Project Management and Support							
OU 1-10 RD/RA Scope of Work (50% of actual cost)	163,301				163,301		
V-Tanks Project Mgmt. and Support	1,382,949	2,365,188			3,748,137		
	$ 1,546,250	**$ 2,365,188**			**$ 3,911,438**		
REMEDIAL DESIGN						**$ 11,217,697**	**$ 11,189,783**
Original Remedy Design							
V-Tanks V-9 Sampling	921,108				921,108		
V-Tanks RD/RAWP and Supporting Documents	1,917,310				1,917,310		
V-Tanks Closure Plan	56,597				56,597		
V-Tanks Safety Analysis	166,290				166,290		
	$ 3,061,305				**$ 3,061,305**		
Early Remedial Action (ERA) Design							
V-Tanks ERA RD/RAWP Addendum (soil sampling and line isolation)	617,352				617,352		
V-Tanks ERA RD/RAWP Addendum Revision (contents consolidation and sampling)	45,533	1,073,280			1,118,813		
	$ 946,233	**$ 1,073,280**			**$ 1,736,165**		
Technology Evaluation and ROD Amendment							
V-Tanks Technology Evaluation	630,698	68,922			699,620		
V-Tanks Technology Evaluation Report	177,307				177,307		
V-Tanks Proposed Plan and ROD Amendment	158,477	40,058			198,535		
V-Tanks Closure Plan	58,289	21,166			79,455		
V-Tanks Conceptual Design	497,728				497,728		
V-Tanks Laboratory Studies	223,840	697,198	218,404	(31%)	1,139,442		
V-Tanks RD/RA Scope of Work	15,247	61,920			77,167		
	$ 2,077,121	**$ 820,342**	**218,404**	**(27%)**	**$ 3,115,867**		
New Remedy Design							
New V-Tanks RD/RAWP and Supporting Documents		2,892,045	188,421	(7%)	3,080,466		
V-Tanks Safety Analysis	44,191	119,799	59,904	(50%)	223,894		
	44,191	**$ 3,011,844**	**248,325**	**(8%)**	**$ 3,304,360**		

Table 8-1. (continued).

	Actual Cost Through FY 03	Estimated Cost	Contingency [a, b]	(percent)	Total Cost FY 03 Dollars	Summary Cost FY 03 Dollars	Summary Cost NPV Dollars
CAPITAL COSTS (continued)							
REMEDIAL ACTION						**$ 16,898,238**	**$16,690,842**
Legacy Waste Management and Disposition	424,474	331,121			755,595		
	$ 424,474	**$ 331,121**			**$ 755,595**		
Early Remedial Action							
V-Tanks Volume Monitoring	69,479	53,028			122,507		
Early Site Preparation	555,662				555,662		
Soil Sampling and V-9 Piping Isolation	504,230	70,032			574,262		
Contents Consolidation and Sampling		2,202,738	98,788	(4%)	2,301,526		
	$ 1,129,371	**$ 2,325,798**	**98,788**	**(4%)**	**$ 3,553,957**		
Tank Contents Remedial Action							
RA Management and Oversight		2,916,830	0	(0%)	2,916,830		
Treatment System Procurement and Delivery		1,171,851	559,894	(48%)	1,731,745		
Mockup Testing Off the INEEL		661,656	338,577	(51%)	1,000,233		
Site Mobilization, Preparation, and Setup		981,601	292,204	(30%)	1,273,805		
Readiness Assessment and Prefinal Inspection		200,000	74,000	(37%)	274,000		
Tank Contents Removal and Treatment		1,107,777	718,893	(65%)	1,826,670		
Waste Sampling, Packaging, and Disposal		818,791	521,877	(64%)	1,340,668		
Tank Contents Prefinal Inspection and Reporting		55,000	15,000	(27%)	70,000		
Treatment System Dismantlement and Demobilization		31,869	15,934	(50%)	47,803		
		$ 7,945,375	**$ 2,536,379**	**(32%)**	**$ 10,481,754**		
Soil, Tanks, and Piping Remedial Action							
Soil Removal and Disposal		1,130,309	282,578	(25%)	1,412,887		
Tanks and Ancillary Piping/Equipment Removal and Disposal		126,306	67,260	(53%)	193,566		
Site Backfill and Restoration		106,591	28,388	(27%)	134,979		
Soil, Tanks, and Piping Prefinal Inspection and Reporting		55,000	15,000	(27%)	70,000		
		$ 1,418,206	**$ 393,226**	**(28%)**	**$ 1,811,432**		
V-Tanks Remedial Action Final Inspection and Reporting							
Final Inspection and RA Report		165,000	48,000	(29%)	213,000		
Closure Certification and Closure Report		65,000	18,000	(28%)	83,000		
		$ 230,000	**66,000**	**(29%)**	**$ 296,000**		
Capital Cost Subtotal	$ 5,638,323	$ 19,521,154			25,159,477		
Contingency			3,451,122				
CAPITAL COST TOTAL	**$ 5,638,323**	**$ 19,521,154**	**$ 3,561,122**	**(18%)**	**$ 28,720,599**	**$ 32,027,873**	**$31,763,337**

Table 8-1. (continued).

	Actual Cost Through FY 03	Estimated Cost	Contingency [a, b] (percent)		Total Cost FY 03 Dollars	Summary Cost FY 03 Dollars	Summary Cost NPV Dollars
OPERATIONS AND MAINTENANCE (O&M) COST							
OU 1-10 Institutional Controls and Five-Year Reviews							
Institutional Controls	100,617	288,000			388,617		
Five-Year Reviews		162,500	48,750	(30%)	211,250		
	$ 100,617	**$ 450,500**	**48,750**	**(11%)**	**$ 599,867**		
O&M Cost Subtotal	100,617	450,500			551,117		
Contingency			48,750	(11%)			
O&M COST TOTAL	**$ 100,617**	**$ 450,500**	**48,750**	**(11%)**	**$ 599,867**	**$ 599,867**	**$ 326,971**
TOTAL ESTIMATED COST	**$ 9,046,214**	**$ 19,971,654**	**$ 3,609,872**	**(18%)**	**$ 32,627,740**	**$ 32,627,741**	**$ 32,090,308**

Notes: a. Contingency is not applied to actual cost.
b. Overall contingency on estimated cost is 18%. The contingency rate applied to each line item varies.

9. STATUTORY DETERMINATIONS FOR THE V-TANKS

Under CERCLA Section 121 and the NCP, the Agencies must select remedies that are protective of human health and the environment, that comply with ARARs (unless a statutory waiver is justified), that are cost effective, and that utilize permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable. In addition, CERCLA includes a preference for remedies that employ, as a principal element, treatment that permanently and significantly reduces the toxicity, mobility, or volume of hazardous wastes, and has a bias against "off-Site disposal" (that is, disposal off the INEEL) of untreated wastes. The following sections discuss how the amended remedy meets these statutory requirements.

9.1 Protection of Human Health and the Environment

The amended remedy will protect human health and the environment from contaminants in the V-Tanks contents by removing the contents from the V-Tanks site. Institutional controls also will ensure that pathways to human or ecological receptors will not be completed during the institutional control period before 2099. Land-use restrictions may be implemented after 2099 to protect human health and the environment if contaminated soils above the final remediation goals are left in place.

9.2 Compliance with ARARS

Implementation of the amended remedy will comply with all ARARs. However, some ARARs identified in the 1999 ROD have been deleted, some corrected, and others added in this amended remedy. Table 9-1 lists all ARARs from the 1999 ROD, changed ARARs, and newly identified ARARs for the amended remedy.

9.2.1 Clarification of ARARs

The Agencies have agreed to clarify and apply ARARs to the remedy as described in the following subsections:

9.2.1.1 One Waste Stream. All the waste in Tanks V-1, V-2, V-3, and V-9 is considered one waste stream. Waste typically was routed through Tank V-9 for solids removal before distribution to V-1, V-2, or V-3, depending on available capacity. While the concentrations of specific hazardous constituents may vary from tank to tank, the overall average concentration of the hazardous waste constituents for all tanks will be used to determine the applicability of LDR treatment standards to the entire waste stream.

9.2.1.2 Waste Characterization. The V-Tanks waste has been characterized as a F001 listed waste under RCRA based on the documented use of trichloroethylene for its solvent properties meeting the F001 listing criteria in 40 CFR 261 Subpart D. The F001 "spent solvent" designation in 40 CFR 261.31 can include other chlorinated solvents (i.e. tetrachloroethylene, methylene chloride, 1,1,1 trichloroethane, carbon tetrachloride, and chlorinated fluorocarbons) that may be present in the V-Tanks waste above the F001 treatment standard. Currently, no determination has been made by NE-ID regarding whether these other solvents meet the criteria for receiving the F001 designation as listed RCRA wastes. However, the V-Tanks waste will be treated to meet the F001 treatment standard in 40 CFR 268.40 for all of the F001 chlorinated solvents. No other listed waste codes are applicable to this waste. Other characteristic codes may be applicable to the waste.

Table 9-1. Summary of ARARs for the V-Tanks amended remedy.

Requirement (Citation)	ARAR Type: Action-Specific	ARAR Type: Chemical - Specific	ARAR Type: Location-Specific	Status: Unchanged	Status: Deleted	Status: New or Modified	Comments
Clean Air Act and Idaho Air Regulations							
IDAPA 58.01.01.161 (formerly IDAPA 16.01.01.161), Toxic Substances		A		X			Applies to air emissions during excavation of soils and during removal and treatment of waste.
IDAPA 58.01.01.500.02 (formerly IDAPA 16.01.01.500.02), Requirements for Portable Equipment	A				X		Administrative requirement only, no substantive requirements. Applies to portable equipment used to remove and treat waste.
IDAPA 58.01.01.585 (formerly IDAPA 16.01.01.585), Toxic Air Pollutants, Noncarcinogenic Increments		A		X			Applies to air emissions during excavation of soils and during removal and treatment of waste.
IDAPA 58.01.01.586 (formerly IDAPA 16.01.01.586), Toxic Air Pollutants, Carcinogenic Increments		A		X			Applies to air emissions during excavation of soils and during removal and treatment of waste.
IDAPA 58.01.01.591 (formerly IDAPA 16.01.01.591), National Emission Standards for Hazardous Air Pollutants, and the following as cited in it:	A					X	Added correct reference. Applies to air emissions during excavation of soils and during removal and treatment of waste.
40 CFR 61.92, National Emission Standards for Hazardous Air Pollutants Standard (NESHAPS)		A		X			Applies to air emissions during excavation of soils and during removal and treatment of waste.
40 CFR 61.93, NESHAPS Emission Monitoring and Test Procedures	A			X			Applies to air emissions during excavation of soils and during removal and treatment of waste.
40 CFR 61.94(a), NESHAPs Emissions Compliance	A			X			Applies to air emissions during excavation of soils and during removal and treatment of waste.
IDAPA 58.01.01.650 and .651 (formerly IDAPA 16.01.01.650 and .651), Rules for Control of Fugitive Dust	A			X			Applies to air emissions during excavation of soils and during removal and treatment of waste.
RCRA and Hazardous Waste Management Act							
Generator Standards							
IDAPA 58.01.05.006 (formerly IDAPA 16.01.05.006), Standards Applicable to Generators of Hazardous Waste, and the following, as cited in it:	A			X			
40 CFR 262.11, Hazardous Waste Determination	A			X			Applies to contaminated soils and tank waste, as well as newly generated secondary waste.
40 CFR 262.20–.23, The Manifest	A			X			Applies to contaminated soils and tank waste, as well as newly generated secondary waste that will be transported.
40 CFR 262.30–.33, Pre-Transport Requirements	A			X			Applies to contaminated soils and tank waste, as well as newly generated secondary waste that will be transported.

Table 9-1. (continued).

Requirement (Citation)	ARAR Type: Action-Specific	ARAR Type: Chemical - Specific	ARAR Type: Location-Specific	Status: Unchanged	Status: Deleted	Status: New or Modified	Comments
General Facility Standards							
IDAPA 58.01.05.008 (formerly IDAPA 16.01.05.008), Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities, and the following, as cited in it:	A			X			
40 CFR 264.13 (a)(1-3), General Waste Analysis	A			X			Applies to V-Tanks waste before treatment and after treatment but before disposal
40 CFR 264.14, Security	A			X			Applies to the treatment facility for the V-Tanks waste at TSF.
40 CFR 264.15, General Inspections Requirements	A			X			Applies to the treatment facility for the V-Tanks waste at TSF.
40 CFR 264.16, Personnel Training	A			X			Applies to the treatment facility for the V-Tanks waste at TSF.
40 CFR 264.Subpart C, Preparedness and Prevention	A			X			Applies to the treatment facility for the V-Tanks waste at TSF.
40 CFR 264.Subpart D, Contingency Plan and Emergency Procedures	A			X			Applies to the treatment facility for the V-Tanks waste at TSF.
40 CFR 264.111(a) and (b) Closure Performance Standards	A					X	Applies to the V-Tanks site after waste removal
40 CFR 264.114, Disposal or Decontamination of Equipment, Structures, Soils	A			X			Applies to equipment used to remove waste and soils, to treat tank waste, and to transport treated waste and contaminated soil. Also applies to the V-Tanks and ancillary lines and equipment.
40 CFR 264.171–.178, Use and Management of Containers	A			X			Applies to containers used during the removal and treatment of V-Tanks waste at TSF.
40 CFR 264.192–.196, Tanks Systems	A					X	Added as applicable to new tank systems used to treat or store V-Tanks waste.
40 CFR 264.197(a), Tank Closure and Post-Closure Care	A			X			Applies to the V-Tanks and to new tanks used in the treatment system at TSF.
40 CFR 264.553(c) and (e), Temporary Units	A					X	Added as applicable to the use of the V-Tanks for the accumulation and subsequent storage of treated waste.
40 CFR 264.554 (a) to (k), Staging Piles	A					X	Added as applicable to staging piles of contaminated soils.

Table 9-1. (continued).

Requirement (Citation)	ARAR Type: Action-Specific	ARAR Type: Chemical - Specific	ARAR Type: Location-Specific	Status: Unchanged	Status: Deleted	Status: New or Modified	Comments
Land Disposal Restrictions							
IDAPA 58.01.05.011 (formerly IDAPA 16.01.05.011) Land Disposal Restrictions, and the following, as cited in it:	A			X			
40 CFR 268.40(a)(b)(e), Applicability of Treatment Standards	A			X			Applies to V-Tanks waste and secondary wastes generated during treatment of the V-Tanks waste.
40 CFR 268.45, Treatment Standards for Hazardous Debris	A			X			Applies to V-Tanks debris and debris associated with the treatment system at TSF.
40 CFR 268.48(a), Universal Treatment Standards	A			X			Applies to V-Tanks waste and secondary wastes generated during treatment of the V-Tanks waste.
40 CFR 268.49, Alternative LDR Treatment Standards for Contaminated Soil	A			X			Applies to contaminated soil from around the V-Tanks.
Toxic Substance Control Act (TSCA)							
40 CFR 761.61(c), Remediation Waste: Risk-based Disposal Approval	A	A				X	Applicable to management and disposal of PCB Remediation Waste at the INEEL.
40 CFR 761.79(b)(1), PCB Decontamination Standards and Procedures: Decontamination Standards	A	A				X	Applicable to decontamination of equipment used to manage PCB contaminated waste.
40 CFR 761.79(c)(1) and (2), Decontamination Standards and Procedures: Self-Implementing Decontamination Procedures	A	A		X			Applicable to decontamination of equipment used to manage PCB contaminated waste.
40 CFR 761.79(d), Decontamination Solvents	A	A		X			Applicable to decontamination of equipment used to manage PCB contaminated waste.
40 CFR 761.79(e), Limitation of Exposure and Control of Releases	A	A		X			Applicable to decontamination of equipment used to manage PCB contaminated waste.
Toxic Substance Control Act (TSCA) (continued)							
40 CFR 761.79(g), Decontamination Waste and Residues	A	A		X			Applicable to decontamination of equipment used to manage PCB contaminated waste.
To-Be-Considered							
DOE Order 5400.5, Chapter II(1)(a, b), Radiation Protection of the Public and the Environment	TBC			X			Applies to the V-Tanks site before, during, and after remediation.
DOE Order 435.1, Radioactive Waste Management	TBC			X			Applies to the V-Tanks site before, during, and after remediation.
Region 10 Final Policy on Institutional Controls at Federal Facilities (EPA 1999a)	TBC			X			Applies to contamination left in place.

Key: A=applicable requirement; TBC = to be considered.

The sampling data at this time is not adequate to exclude some of the potentially applicable characteristic "D" codes. Interference between compounds during the laboratory analysis of waste samples resulted in detection limits that exceeded characteristic levels for some of the "D"-coded waste constituents. That means it is not possible to determine if the actual concentrations in the waste exceed the applicable limits for some constituents. Until the additional planned sampling is completed, the Agencies will assume that the "D" characteristic codes are applicable for those codes where the interference prevents a determination on the applicability of the "D" code. This means that the treatment system will be designed to meet the "D" code treatment standards and associated Universal Treatment Standards (UTS) for any Underlying Hazardous Constituents (UHCs). This is in addition to the applicable F001 treatment standards. If the additional sampling effort demonstrates that the V-Tanks waste does not exhibit any hazardous characteristic so that there are no applicable "D" codes, then treatment goals will be modified in the RD/RA Workplan to achieve compliance with only the applicable F001 treatment standards. In that case, treatment of UHCs to UTS levels will not be required.

9.2.1.3 Management of PCB Remediation Waste. The Agencies have determined that the management of PCB remediation waste will be modified in accordance with the ARAR, 40 CFR 761.61(c). Under TSCA, separate analysis of the liquid phase (< 0.1 mg/kg) and the sludge phase (294 mg/kg) is required. If the waste is not separated into its separate phases, the combined waste must be managed as if the combined waste were at the concentration of the higher phase (40 CFR 761.1[b][4][iv]). The waste in the V-Tanks will, therefore, be managed at the as-found concentration of the highest individual phase (294 mg/kg), rather than the 18 mg/kg average concentration. The PCBs in the V-Tanks waste are the result of historical spills or unauthorized releases of PCB-containing materials from nuclear testing and development activities at TAN. Drains from within the TAN facilities collected spilled materials and routed the waste to the V-Tanks. The V-Tanks were installed for the express purpose of collecting waste products from TAN activities for appropriate management (i.e., as pollution control devices). The waste in the V-Tanks (an aqueous industrial sludge) meets the definition of PCB remediation waste under 40 CFR 761.3. Bulk PCB remediation waste with a concentration greater than 50 ppm may be disposed of without treatment in a hazardous waste landfill (40 CFR 761.61[a][5][iii]). For CERCLA waste, the ICDF is equivalent to a hazardous waste landfill and, therefore, may receive the V-Tanks waste for disposal. The V-Tanks waste is also less than the ICDF WAC upper limit for PCBs established at 500 ppm.

The TSCA prohibits the land disposal of waste(s) greater than 50 mg/kg that fail the paint filter test. The TSCA also prohibits the solidification of this waste to pass the paint filter test unless a risk-based petition is approved under 40 CFR 761.61(c). The ARAR 40 CFR 761.61(c) allows a risk-based petition showing the planned treatment for the V-Tanks waste, the final disposition at the ICDF, and a demonstration of the acceptable risk resulting from management of the waste according to this plan. The information required for this petition has been compiled in "Risk-Based Approach for Management of PCB Remediation Waste from the V-Tanks" (Engineering Design File [EDF]-3077), and that document has been placed in the Administrative Record for OU 1-10. Signature by EPA of this ROD Amendment constitutes the CERCLA equivalent of the approval required under TSCA, confirming that EPA finds the proposed management approach does not pose an unreasonable risk of injury to human health or the environment.

9.2.1.4 Characterization of Secondary Waste as F001 Listed Waste. VOCs, mercury, or other hazardous constituents released during the chemical oxidation/reduction or stabilization processes and collected on activated carbon, sulfur-impregnated carbon, or HEPA filters is a new waste stream, with its own treatment requirements. After treatment of the V-Tanks contents, these secondary wastes will be characterized as F001, and further characterized to determine if the stream exhibits any of the characteristics of a hazardous waste. Applicable treatment standards will be assigned based on these characteristics. The secondary waste will be tested to determine if it meets applicable LDR treatment standards, and it will be treated, as appropriate.

9.2.1.5 Temporary Use for Accumulation. Tank systems that are used to manage hazardous waste are typically required to have secondary containment. New tank systems that are installed as part of the remedy will meet that requirement. However, the remedy design may call for the existing V-Tanks to be temporarily used (for an anticipated period of less than one year) to provide an accumulation location for treated waste prior to stabilization without secondary containment. An evaluation of the tanks as documented in "Use of V-1, V-2, and V-3 for Storing, Blending, and Accumulating Waste During Remediation of the V-Tanks" (EDF-3948) demonstrates that the tanks meet the requirements of 40 CFR 264.553(c), allowing the temporary use of these tanks during remediation. Signature of this ROD Amendment constitutes the CERCLA equivalent of the approval required under RCRA for use of the V-Tanks for accumulation and subsequent storage of treated waste during the treatment operation without secondary containment.

9.2.1.6 Staging Piles. Based on the presence of F001-listed hazardous constituents in the contents of the V-Tanks, and documented spills of the tank waste to soils at the ground surface during waste transfers, it is assumed that the contaminated soil (which resulted from spills during some pumping operations to remove excess liquid from the V-Tanks) also carries the F001 code. Soil sampling results to date have not revealed detectable concentrations of the hazardous constituents for which the F001 code applies. Regardless, the application of the F001 code to the contaminated soils means the contaminated soils must be managed in accordance with RCRA regulations. In accordance with the 1999 OU 1-10 ROD, contaminated soils will be excavated and disposed of at the ICDF. During excavation and prior to transport, the contaminated soils may be placed directly in roll-off boxes or may be placed in staging piles. 40 CFR 264.554(a) to (k), "Staging Piles," is cited as an ARAR for contaminated soils, in case the remedial design determines that staging piles are a necessary feature of the remedial action.

9.3 Cost Effectiveness

In the Agencies' judgment, the amended remedy is cost effective and represents a reasonable value for the money to be spent. In making this determination, the Agencies used the following definition from NCP Section 300.430(f)(1)(ii)(D): "A remedy shall be cost effective if its costs are proportional to its overall effectiveness." The Agencies' determination was accomplished by evaluating the "overall effectiveness" of those alternatives that satisfied the threshold criteria (i.e., were both protective of human health and the environment and compliant with ARARs). Overall effectiveness is evaluated by assessing three of the five balancing criteria in combination: long-term effectiveness and permanence; reduction in toxicity, mobility, or volume through treatment; and short-term effectiveness, and then comparing the overall effectiveness to costs to determine cost effectiveness. The relationship of the overall effectiveness of the amended remedy was determined to be proportional to its costs and, hence, it represents a reasonable value for the money to be spent.

The estimated life-cycle cost in NPV for the amended remedy is $32.1 million, as presented in Table 8-1. (The NPV includes actual costs expended through September 2003 but does not include a contingency on the actual costs.)

9.4 Utilization of Permanent Solutions and Alternative Treatment or Resource Recovery Technologies to the Maximum Extent Practicable

The Agencies have determined that the amended remedy represents the maximum extent to which permanent solutions and treatment technologies can be utilized in a practicable manner for the final remedial action at this V-Tanks site. The Agencies determined that the amended remedy provides the best balance of tradeoffs in terms of the five balancing criteria (described in Section 7), while also considering the statutory preference for treatment as a principal element and bias against treatment and disposal off the INEEL, and considering state and community acceptance.

9.5 Preference for Treatment as a Principal Element

The statutory preference for remedies that employ treatment as a principal element is satisfied because treatment is used to destroy organic compounds including PCBs and to stabilize inorganic contaminants including metals and radionuclides.

9.6 Five-Year Review Requirements

Under the amended remedy, the contamination in the V-Tanks contents will be removed from the V-Tanks site. However, pursuant to the original remedy, contaminants in the surrounding soil may remain on the INEEL during the remedial action above levels that allow for unlimited use and unrestricted exposure. Therefore, a statutory review will be conducted within 5 years after initiation of remedial action, and at least every 5 years thereafter through the standard CERCLA 5-year review process. The reviews will be conducted to ensure that the amended remedy is, or will be, protective of human health and the environment. This provision does not preclude more frequent reviews by one or more of the Agencies.

10. DOCUMENTATION OF SIGNIFICANT CHANGES

This section documents both significant and minor changes to the V-Tanks remedy. Section 10.1 summarizes three significant and two minor changes from the 2003 Proposed Plan.

10.1 Changes to the V-Tanks Remedy from the Proposed Plan

The following are three significant changes made to the V-Tanks remedy from the 2003 Proposed Plan:

1. Further sampling and/or analysis of the V-Tanks contents will be completed to support refinement of the RCRA characteristic evaluation to determine whether treatment is required for underlying hazardous constituents. The results of this effort will be subject to review and concurrence by the Agencies.

2. An option to decant and separately treat some of the liquid from the tanks was added to the amended remedy. To optimize the treatment of the V-Tanks contents, the 2003 TER considered removal and treatment of a portion of the liquid phase in the evaluation of the remedial alternatives. The Proposed Plan did not specify this option. This option may be implemented if laboratory studies establish a clear benefit.

3. The selected remedy is ex situ chemical oxidation/reduction to treat VOCs to both F001 LDR treatment standards and disposal facility waste acceptance criteria. PCBs also will be chemically oxidized/reduced as necessary to demonstrate no unreasonable risk to human health and the environment, as part of the PCB risk-based management approach under 40 CFR 761.61(c) (see Section 9.2.1.3, "Management of PCB Remediation Waste"). Chemical oxidation/reduction also will be required for specific underlying hazardous constituents (e.g., BEHP) if the waste is confirmed to be RCRA characteristic. Resulting treatment residues will be solidified or stabilized as necessary to meet the ICDF or other approved disposal facility WAC.

The following are two minor changes made to the V-Tanks remedy from the 2003 Proposed Plan:

1. During the data validation process, a laboratory error was discovered in the calculation of inorganic concentrations. This error has been corrected in Table 2-2 of this document. The changes in the data would not have significantly affected the technology evaluation or the selection process.

2. The titles of the Thermal Desorption alternatives were modified for clarity. No other changes were made to these alternatives.

11. EXPLANATION OF SIGNIFICANT DIFFERENCES

This section documents significant changes and clarifications to existing remedies and documents public participation activities. Section 11.1 summarizes a significant change to the original remedy for the PM-2A Tanks. Section 11.2 clarifies portions of the original remedy selected in the 1999 ROD for remediation of contaminated soil at both the V-Tanks and PM-2A Tanks sites. Section 11.3 documents a significant change to the Reactor Vessel Burial Site. Section 11.4 documents the public participation efforts associated with these changes.

11.1 Changes to the PM-2A Tanks Remedy from the 1999 Record of Decision

One significant change was made to the PM-2A Tanks remedy from the 1999 ROD. The change was made in part to support the INEEL accelerated cleanup initiative.

Like the V-Tanks, the PM-2A Tanks are being remediated to prevent any potential future release of the tank contents to the environment. The PM-2A Tanks contain solidified sludge contaminated with radionuclides, organic compounds (including chlorinated solvents), and inorganic contaminants (including metals). Unlike the V-Tanks, essentially no free liquids are present in the PM-2A Tanks because in 1981 the tanks were partially filled with material to absorb free liquid. As with the V-Tanks, the contents of the PM-2A Tanks are considered F001 listed based upon the documented use of trichloroethylene for its solvent properties. The F001 "spent solvent" designation includes other chlorinated solvents (i.e. tetrachloroethylene, methylene chloride, 1,1,1 trichloroethane, carbon tetrachloride, and chlorinated fluorocarbons) that may be present in the PM-2A Tanks waste above the F001 treatment standard. Currently, no determination has been made by NE-ID regarding whether these other solvents meet the criteria for receiving the F001 designation as F001 listed RCRA waste. However, the PM-2A Tanks waste will be treated to meet the F001 treatment standard in 40 CFR 268.40 for all of the F001 chlorinated solvents.

As with the V-Tanks, some of the soil surrounding the tanks is contaminated, principally with Cs-137. The contamination originated from accidental releases during periodic pumping operations to remove excess liquid from the PM-2A Tanks (Section 4.1.6 of the 1997 RI/FS provides more information about PM-2A Tanks operations). The tanks are part of a system that includes ancillary piping and equipment within the area designated as the PM-2A Tanks site. The surrounding contaminated soils and associated piping will be remediated along with the PM-2A Tanks.

The original selected remedial action for the PM-2A Tanks contents documented in the 1999 ROD was identified as "Alternative 3d: Soil Excavation, Tank Content Vacuum Removal, Treatment, and Disposal." However, during remedial design activities, including additional sampling, the Agencies determined the tanks are structurally strong enough that they could be removed intact, with the contents still inside. As described in Section 7.2.2.2 of the 1999 ROD, "removal and decontamination [of the tank contents and the tanks themselves] increase the chance of worker exposure and, therefore, lower the short-term effectiveness." In addition to avoiding potential worker exposure, removal of the tanks with the contents inside will cost less and require less time to complete remediation. As provided in the original selected remedy, the tank contents will be treated as necessary to destroy or remove the F001 listed constituents to meet LDRs and stabilized to meet other WAC for the disposal at the ICDF or other approved facility.

As stated above, although significant changes are not being made to the part of the remedy that deals with the removal and disposal of contaminated soil from around the tanks and the tanks themselves, these parts of the remedy are being modified for clarity. Details about these changes are provided in Section 11.2.

The original remedy called for removal of the tank contents, decontamination of the tanks, filling the tanks with an inert material, and leaving the tanks in place. Under the new remedy, after the tanks are excavated with the contents still inside and the contents treated as necessary, the tanks and treated contents will be transported to the ICDF or other approved facility for disposal. Void space in the tanks will be filled pursuant to that facility's WAC.

Table 11-1 lists components of the original remedy that are being changed.

Removing the tanks with the waste still inside improves short-term effectiveness. Potential risks to workers are avoided because the contents will not be removed from the tanks. Keeping the waste inside the tanks also reduces the potential for release of the contaminated materials to the environment during remediation. In addition, removing the tanks allows the sand bedding, cradle, and soil under the tanks to be directly accessible for inspection and sampling to confirm that no releases have occurred from the tanks.

As specified under the original remedy, the contents will be treated as necessary to meet disposal facility WAC. The results of sampling activities conducted in 2003 indicated that, except for tetrachloroethylene (PCE), the contents meet LDRs. The tank contents are expected to be treated through thermal desorption or chemical oxidation/reduction to reduce the PCE to meet LDRs and disposal facility WAC. Treatment will take place at or adjacent to the PM-2A Tanks site (e.g., TAN 607) as necessary to facilitate remediation. Treatment studies will be conducted as necessary to select and refine the most appropriate treatment option. After treatment, the tank contents will be re-sampled to confirm compliance with LDRs and the applicable disposal facility WAC, and the tanks and the treated contents will be transported to the ICDF or other approved facility for disposal.

Based on a "rough order of magnitude" cost estimate, the modified remedy is projected to cost approximately 20 percent less than the original selected remedy (the original selected remedy was estimated in 1999 to cost $6.6 million). The cost savings are primarily the result of eliminating the vacuum system equipment and controls necessary to remove and manage the tank contents separately from the tanks.

Table 11-1. Changes to the selected remedy for the PM-2A Tanks (TSF-26).

Remedial Action Element	Original Remedy	Remedy Change
Waste Removal	Removing tank contents using commercial vacuum excavation technology	Tanks will be removed with the waste still inside.
Decontamination	Decontaminating the tanks and filling with inert material	There is no need to decontaminate the tanks since they will no longer be left in place but disposed of at the ICDF or other approved facility. Before disposal, the contents of the tanks will be treated as necessary to meet LDRs and disposal facility WAC. Void space in the tanks will be filled, as necessary or desirable, as part of disposal facility operations.
Waste Treatment	Verification of the waste form not requiring treatment before disposal (and treating tank contents to meet waste acceptance criteria, if necessary).	The waste in the tanks will be treated as necessary to meet LDRs and disposal facility WAC. Confirmation sampling will be conducted to verify that no further treatment is necessary prior to disposal.
Estimated Cost	$6.6 million	$5.3 million[a]

a. Cost estimate for remedy change was prepared as a "rough order of magnitude" estimate.

11.2 Clarifications to the V-Tanks and PM-2A Tanks Remedies from the 1999 Record of Decision

Clarifications are made to the 1999 ROD for remediation of contaminated soil at Sites TSF-09 and TSF-18 (the V-Tanks) and Site TSF-26 (the PM-2A Tanks). For these sites, the 1999 ROD identified the source of soil contamination as being from spills during transfer of waste to and/or from the tanks. Based on site characterization, the baseline risk assessment for these sites only addressed soils surrounding the tanks. From the site characterization and the risk assessment, Cs-137 was identified as a contaminant of concern and the final remediation goal of 23.3 pCi/g was established as the cleanup level.

The 1999 ROD did not address, in detail, the potential for soil contamination under the tanks and piping due to leaks. To cover this potential, the 1999 ROD called for (a) post-remediation soil sampling at the bottom of each excavation to verify FRGs are met, and (b) analysis of the soil samples for additional contaminants present in the tanks' contents to perform a risk analysis in support of an institutional control determination for each site.

As the V-Tanks and associated piping are removed, the underlying soils will be evaluated to determine if there is any evidence of a leak or release of the V-Tanks contents. This evaluation will include visual examinations of the tanks and piping, visual evaluations for staining of underlying soils, and radioactive field screening. If there is evidence of a leak or release, then post-remediation sampling for tank contaminants and further risk analysis are necessary that support a potential revision to the FRGs, if there is a need for further actions. This determination could lead to application of institutional controls, further remediation, or no action. The following clarifications, therefore, are made to the soil remedy description for the V-Tanks and the PM-2A Tanks sites to more clearly distinguish between the remedy requirements for soils surrounding the tanks and piping (above or adjacent to the tanks and piping and typically between ground surface and 3 m [10 ft] bgs) and soil beneath the tanks and piping (typically more than 3 m [10 ft] bgs):

- The soil remedy description for Sites TSF-09 and TSF-18 (the V-Tanks) is clarified in Table 11-2
- The soil remedy description for Site TSF-26 (the PM-2A Tanks) is clarified in Table 11-3
- The overall soil management strategy for Sites TSF-09 and TSF-18 (the V-Tanks) and Site TSF-26 (the PM-2A Tanks) is illustrated in Figure 11-1.

11.3 Changes to the Remedy for the Reactor Vessel Burial Site (TSF-06, Area 10) from the 1999 Record of Decision

A significant change from the determinations documented in the 1999 ROD is made for the Reactor Vessel Burial Site (TSF-06, Area 10). This potential release site was evaluated as part of the WAG 1 Comprehensive Remedial Investigation/Feasibility Study (DOE-ID 1997). As no pathway existed to human or ecological receptors, no cleanup was required and therefore the site was documented as a "No Action" site in the 1999 ROD.

Table 11-2. Clarifications to the soil remedy description for Sites TSF-09 and TSF-18 (the V-Tanks).

Remedial Action Element	Original Remedy	Remedy Clarification
Final Remediation Goal	The FRG is 23.3 pCi/g for Cs-137.	FRGs apply in a different manner for soil to a depth of 3 m (10 ft) bgs and to soil more than 3 m (10 ft) bgs: Excavation of soil exceeding the Cs-137 FRG of 23.3 pCi/g to a maximum depth of 3 m (10 ft) bgs Application of institutional controls for soil exceeding the Cs-137 FRG of 23.3 pCi/g that is more than 3 m (10 ft) bgs.
Extent of Excavation	Excavating contaminated soil. Contaminated soil that is above the 23.3 pCi/g FRG for Cs-137 will be removed to the bottom of the excavation of the V-Tanks and will be disposed of.	Excavating contaminated soil that exceeds the FRG to a maximum of 3 m (10 ft) bgs. Excavating additional soil below 3 m (10 ft) bgs to the extent necessary to remove the V-Tanks and associated piping.
Post-Remediation Sampling	Post-remediation soil sampling at the bottom of the excavation to verify FRGs are met and to analyze for additional V-Tanks contaminants in order to perform a risk analysis in support of an institutional control determination at this site.	Post-remediation soil sampling to verify FRGs are met and to analyze for additional contaminants if excavation indicates a release of the V-Tanks contents. Clarified as follows: For the contaminated soil less than 3 m (10 ft) bgs, post-remediation sampling to verify the Cs-137 FRG is met. For the contaminated soil that is more than 3 m (10 ft) bgs, post-remediation sampling to determine the need for institutional controls. For the contaminated soil beneath the V-Tanks and piping where there *is* evidence of a release (a leak from a tank or the piping), post-remediation soil sampling at the bottom of the excavation, to analyze for V-Tanks contaminants to support a risk analysis that supports a potential revision to the FRGs and a determination of the need for further actions. This determination could lead to application of institutional controls, further remediation, or no action. For the contaminated soil beneath the V-Tanks and piping where there is *no* evidence of a release either from the V-Tanks or the associated piping, post-remediation soil sampling to determine the appropriate institutional controls.
Institutional Controls	Additional institutional controls may be required based on the contamination remaining at the V-Tanks sites after completion of the remedial action.	Institutional controls will be required if contamination remaining at the site precludes unrestricted land use after completion of the remedial action.

Table 11-3. Clarifications to the soil remedy description for Site TSF-26 (the PM-2A Tanks).

Remedial Action Element	Original Remedy	Remedy Clarification
Final Remediation Goal	The FRG is 23.3 pCi/g for Cs-137.	FRGs apply in a different manner for soil to a depth of 3 m (10 ft) bgs and to soil more than 3 m (10 ft) bgs: Excavation of soil exceeding the Cs-137 FRG of 23.3 pCi/g to a maximum depth of 3 m (10 ft) bgs Application of institutional controls for soils exceeding the Cs-137 FRG of 23.3 pCi/g more than 3 m (10 ft) bgs).
Extent of Excavation	Excavating contaminated soil. Contaminated soil that is above the 23.3 pCi/g FRG for Cs-137 will be removed to the bottom of the excavation of the PM-2A Tanks and will be disposed of.	Excavating contaminated soil exceeding the FRG to a maximum of 3 m (10 ft) bgs. Excavating additional soil exceeding the FRG below 3 m (10 ft) bgs to the extent necessary to remove the PM-2A Tanks and associated piping.
Post-Remediation Sampling	Post-remediation soil sampling at the bottom of the excavation to verify FRGs are met and to analyze for additional PM-2A Tank contaminants in order to perform a risk analysis in support of an institutional control determination at this site.	Post-remediation soil sampling to verify final remediation goals (FRGs) are met and to analyze for additional contaminants if excavation indicates a release of the PM-2A Tanks contents waste. Clarified as follows: For contaminated soil less than 3 m (10 ft) bgs, post-remediation sampling to verify the Cs-137 FRG is met. For contaminated soil more than 3 m (10 ft) bgs, post-remediation sampling to determine need for institutional controls. For contaminated soil beneath the PM-2A Tanks and piping, where there is evidence of a release (leak from tank or piping), post-remediation soil sampling at the bottom of the excavation to analyze for PM-2A tanks contaminants to support a risk analysis that supports a potential revision to the FRGs and a determination of the need for further actions. This determination could lead to application of institutional controls, further remediation, or no action. For contaminated soil beneath the PM-2A Tanks and piping, where there is no evidence of a release from tank or associated piping, post-remediation soil sampling to determine the appropriate institutional controls, if any, for this site.
Institutional Controls	Based on the results of post remedial action sampling, institutional controls may be required.	Institutional controls will be required if contamination precludes unrestricted land use after completion of remedial action.

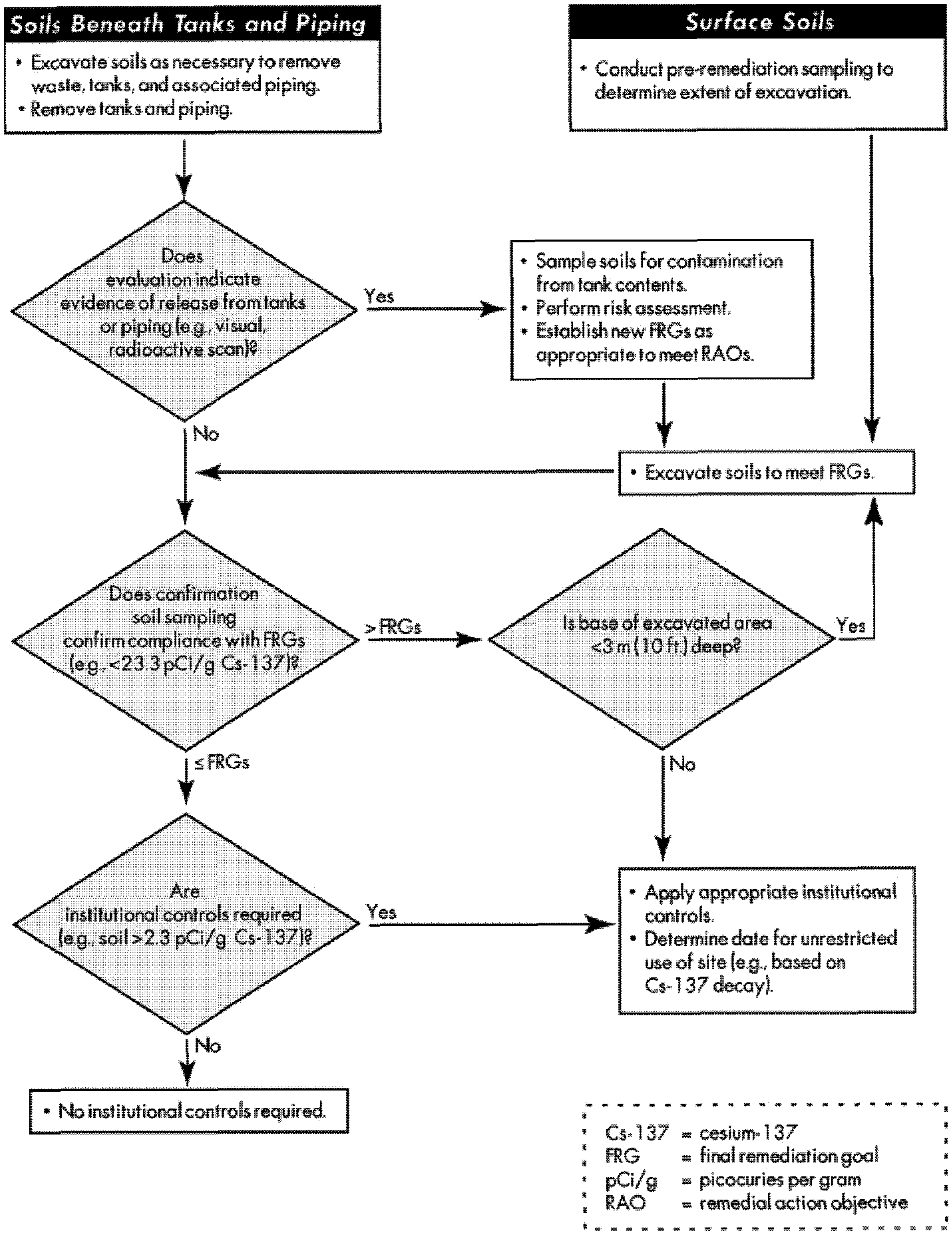

Figure 11-1. Confirmation soil sampling strategy for Operable Unit 1-10.

However, during public participation activities conducted in 2003 in connection with the 2003 Proposed Plan, a commenting group submitted a question regarding the status of this site. The comment prompted a review of the relevant documentation for the site. Even though no pathway exists to human or ecological receptors, residual contamination at the site precludes unrestricted land use. Thus, the site should more appropriately be designated as "No Further Action" (as that term is defined in the FFA/CO) and protected with institutional controls.

The institutional control requirements for this site are provided in Table 11-4. The Institutional Controls Plan governing OU 1-10 will be modified to include appropriate institutional controls for this site. The Agencies are pleased to note that the value of the CERCLA public involvement process has been confirmed.

11.4 Explanation of Significant Differences Public Participation

The INEEL will publish a notice of availability and a brief description of these ESD changes in the local newspaper (the Idaho Falls *Post Register*) and six other Idaho newspapers to meet the requirements of 40 CFR 300.435(c)(2)(i). The INEEL Community Relations Office may be contacted at (208) 526-3183 or (800) 708-2680. There will be no formal comment period.

Table 11-4. Institutional control requirements for the Reactor Vessel Burial Site (TSF-06, Area 10).

Site TSF-06, Area 10. Risk at this site precludes unrestricted land use and, therefore, requires institutional controls. Institutional controls will be maintained until the site is released for unrestricted use in a 5-year review.

Timeframe	Land Restriction	Exposure Concern	Objective	Controls	Regulatory Basis or Authority
DOE control	Industrial	Radionuclides	Ensure limited exposure to contaminated soil.	1. Visible access restrictions	FFA/CO (DOE-ID 1991) National Oil and Hazardous Substances Pollution Control Plan (40 CFR Part 300)
				2. Control of activities	CERCLA (42 USC 9620 & 120[h])
			Ensure land use is appropriate.	1. Property lease requirements including control of land use, if necessary	CERCLA (42 USC 9620 & 120[h][5]) Hall Amendment of the National Defense Authorization Act (Public Law 103-160) Property release restrictions (DOE Order 5400.5)
Post DOE control	Industrial	Radionuclides	Ensure land use is appropriate.	1. Property transfer requirements including issuance of a finding of suitability to transfer and control of land use, if necessary	FFA/CO (DOE-ID 1991) CERCLA (42 USC 9620 & 120[h][3][d]) CERCLA (42 USC 9620 & 120[h][3][C][ii]) CERCLA (42 USC 9620 & 120[h][3][A][iii]) CERCLA (42 USC 9620 & 120[h][l]-[3]) CERCLA (42 USC 9620 & 12O[h][4]) Property relinquishment notification (43 CFR 2372.1) Criterion for BLM acceptance of property (43 CFR 2374.2) Excess property reporting requirements (41 CFR 101-47.202-1,-2,-7) Property release restrictions (DOE Order 5400.5)

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